THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

JANUARY, 1908.

ORIGINAL ARTICLES.

THE DIAGNOSIS AND TREATMENT OF CARDIOVASCULAR-RENAL DISEASE.[1]

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The meaning of the term cardiovascular-renal disease is evident. That such an association is of frequent occurrence every practitioner of experience knows. There are, however, differences in the morbid states and in the mode of invasion which influence both prognosis and treatment, and which are still imperfectly understood by many. I have for many years taken opportunity to emphasize these differences, but as I am constantly reminded in my relations with physicians that efforts in this direction have been only partially successful, I have decided to ask the indulgence of this influential body while I consider the subject somewhat further.

To begin with the simplest and best understood of the processes, it was noted almost as early as Bright recognized the varieties of morbid states associated with his name, that in a certain number of them there was hypertrophy of the heart with thickening and hardening of the arteries. Bright himself refers to both. To the arterial condition the name of arteriosclerosis was later applied and continues to be in general use. As in the further evolution of our knowledge it has been found to occur in two forms, a diffuse and a localized form, I may add that in using the term I intend the more diffuse variety, that to which von Basch has applied the name angiosclerosis, invading the vascular system as a whole and espe-

[1] Read at a meeting of the Kings County (New York) Medical Society, April 16, 1907.

cially the smaller vessels. To the present day an explanation of this process satisfactory to all has not been vouchsafed. Bright ascribed the cardiac hypertrophy to overaction of the heart exerted in response to a direct cardiac irritant, or to overcome a resistance in the capillaries. This stimulus and resistance he ascribed to an altered quality of the blood consisting in the accumulation of toxic substances arising from defective renal excretion. Sir George Johnson elaborated the idea of a hypertrophic process in the muscular coat and transferred the irritation to the smaller arteries which further reacted upon increased effort of the heart to overcome the resistance. So far as I can learn from an examination of Bright's[2] original papers, his reference seems to be wholly to the coarser atheromatous changes which occur in the larger blood-vessels, including the aorta, and in other diseases as well—changes which are visible to the naked eye. Bright's views on the vascular changes may therefore be disregarded. In 1877 Ewald suggested an interesting modification of Johnson's theory. He also found a hypertrophy of the muscular coat of the systemic arterioles which he ascribed to increased viscosity of the blood and resulting friction in the capillaries.[3] The cardiac hypertrophy he ascribed as did Johnson to the cardiac effort to overcome the resistance in the arterioles. Though of recent authors, Johnson's pupil, Nestor Tirard, still holds to his master's view, it has been generally discarded for the more modern one, that the changes are primarily irritative, beginning at times in the media or muscular coat and extending thence to the intima and external coats, at others in the intima, always first in the arteries of small size.

One would suppose that the changes should always begin in the intima which is next the irritant blood, but that they begin also in the media is established and confirmed by recent experimental studies of R. A. Pearce and E. Mac D. Stanton[4]. It has been alleged, too, that the lesion in the media is essentially the result of injury to the elastica, the changes in the intima constituting a repair process whose object is to compensate for the weakened media and the widened lumen. It may be through the vasa vasorum that the middle coat is thus attacked by the toxic constituents of the blood. Or the thickening of the media may be the result of over pressure due to spasm excited by irritating toxins.

Confirmatory evidence of the irritant nature of the cause is found in the fact that the thickening and hardening increase with the duration of the renal disease, not always, however, in a corresponding proportion. Moreover, other conditions associated with toxic

[2] Bright's Medical Reports, 1827, and his later paper in vol. i of Guy's Hospital Reports, 1836, Cases and Observations Illustrative of Renal Disease, etc.

[3] Virchow's Archiv, vol. lxxi.

[4] Experimental Arteriosclerosis, Transactions of the Association of American Physicians, vol. xx, 1905.

states of the blood are attended by like changes in the arteries. Such are diabetes mellitus, syphilis, alcohol, lead poisoning, the poison of gout and other products of overfeeding and overdrinking, overexertion, and especially overexertion with an excessive use of alcohol, as illustrated in workmen and drivers employed in breweries where enormous quantities of beer are drunk. To the hyperplasia succeeds in various degrees degeneration, usually fatty but sometimes calcareous, resulting in weakness of the vessel walls and occasional rupture, especially in the bloodvessels of the brain. This process extends also to the bloodvessels of the kidney in contracted kidney, but not as a rule in chronic parenchymatous nephritis.

Almost invariably associated with the sclerosis of the vessels is hypertrophy of the left ventricle induced by the effort to overcome the arterial resistance and probably also as already mentioned to the direct stimulus of an irritating blood. This resistance is a complex factor, including first that of the narrowed and non-elastic vessel wall; second, the increased tension causing increased intravascular pressure and possibly also a compensatory action assumed by the heart in order to increase the secretion of urine by forcing more blood through the kidney. Nervous strain such as characterizes the strenous life of the modern business man has come to be regarded as a cause of high tension, itself a cause of sclerosis. My colleague, Dr. Alfred Stengel, who has written two or three good papers on this subject would even include neurasthenia and shock among the nervous causes operating in this way. The toxins of the acute infectious diseases may have an effect, while heredity plays an important role. In a noteworthy paper Dr. O. T. Osborne[5] suggests that certain internal secretions especially those of the thyroid gland and suprarenal capsules may be responsible for a high tension which will cause arteriosclerosis. Since the thyroid contributes a vasodilator substance and the suprarenals a vasoconstrictor stuff, an increase of tension may be caused by a diminution of thyroid secretion and an excess of suprarenal. Josué and Gouget, and after them Pearce, produced arterioscleroiss by the intravenous injection of adrenalin in rabbits. In view of the recently discovered relation of the suprarenal secretion to glycosuria we may have a further explanation of the high degree of arteriosclerosis so frequent in diabetes mellitus. The cardiac hypertrophy affects both the left and the right ventricle, but more frequently the left, as shown by the following from a recent paper by Dr. Nathaniel Bowditch Potter.[6]

[5] The Etiology and Treatment of Arteriosclerosis, New York Med. Jour., August 20, 1904.

[6] Cardiac Hypertrophy as Observed in Chronic Nephritis, Jour. Amer. Med., Assoc., October 27, 1906, vol. xlvii.

286 *autopsies*, 151 *cases of nephritis.*

	Per cent. of hyp. of L. V.	Per cent. of hyp. of L. and R. V.	Per cent. of normal or Atro-heart.
66 chronic interstitial	30.5	11.5	58.0
22 arteriosclerotic interstitial	27.0	9.0	64.0
25 chronic parenchymatous	12.0	4.0	84.0

Recent observations go to show a larger number of cases in which all the chambers of the heart were hypertrophied.

While arterial sclerosis, recognized by a sharply accentuated aortic second sound, hypertrophy of the left ventricle with the apex displaced to the left, hard sclerosed radials, increased tension and increased blood pressure may arise quite independently of renal disease, I still hold with others that it may be also the direct result of such disease, and I may say any form of renal disease sufficiently prolonged; it is much more frequently associated with the chronically contracted kidney. Cardiac murmurs are conspicuously absent. Indeed, the presence of such murmurs removes the diagnostic value of the hypertrophy, since they point to other causes of it. On the other hand, the first sound is strong and prolonged until toward the end, when it loses its muscular character and becomes shorter and sharper. The few instances of chronic renal disease in which hypertrophy does not occur are those in which there is debility with defective nutrition, when the heart is too weak to make the extra effort required to produce hypertrophy. These cases are generally found in old persons and others whose vitality is low. Sir William Gull,[7] in a clinical lecture on Chronic Bright's Disease with Contracted Kidney, at Guy's Hospital, in 1872, referred to this form in the following language: "And here it should be observed that the kidney may undergo fibroid contraction and disorganization, and cause death by uremia, without being associated with change in the heart and arteries upon which I desire to discourse in this lecture." He continues: "In such cases the renal disease is probably due to some hereditary or congenital defect in the kidneys themselves, and is more strictly a local affection; and although the results, so far as the kidneys are concerned, may be very much like, or even apparently identical with, the more morbid conditions arising under other circumstances, what constitutional accompaniments there are, are widely different from such as occur in the disease now spoken of," referring to the condition of general arteriosclerosis (arteriocapillary fibrosis), under consideration.

Reference has been made to other causes than renal disease responsible for the arterial thickening and secondarily cardiac hypertrophy. Indeed, there are those who claim that renal disease

[7] British Med. Jour., December 21, 1872. See also collected writings.

is never the cause of arterial sclerosis, but that, on the other hand, it and especially renal contraction, with its fibroid overgrowth, is the direct result of such sclerosis of the bloodvessels of the kidney shared with the system at large, and that the cardiac hypertrophy is the result of resistance as before. To prove this was the object of the classic papers of Gull and Sutton on "Chronic Bright's Disease with Contracted Kidney (Arteriocapillary Fibrosis), published in 1872.[8] This may be the case with the arterial sclerosis and the associated renal contraction of old persons, and I repeat that I am ready to admit a primary general arteriosclerosis like that contended for by Gull and Sutton, but I still hold that many cases of arterial sclerosis are secondary to a primary renal contraction, although perhaps not so often as once supposed. The result is, however, the same, combined vascular and renal disease in which the cardiac hypertrophy is secondary to the arterial sclerosis.

If I am asked to point out clinical differences between these two varieties of sclerosis I find it difficult. Both are equally insidious, in both there is the absence of dropsy except in the very last stages of the form with primary renal sclerosis, though here it is also rare while it is wanting throughout in general arteriosclerosis. In both there is a scanty albuminuria with very few hyaline casts, but if the opportunity presents to study the urine for a time I should say the albumin and casts appear earlier in the primary renal cases. Indeed, in general arteriosclerosis there is often no albuminuria whatever, although hyaline casts are present. In general arteriosclerosis there are often brain symptoms due to anemia and imperfect circulation, namely, vertigo, tinnitus, and amaurosis. In addition to this there is often met a set of symptoms simulating those of uremia, but still not uremia. In the latter condition retinal changes occur early, but they are not those of retinitis albuminurica and hemorrhage into the retina. As pointed out by de Schweinitz there is thickening of the arteries which compress the veins where they cross them. These changes may occur early. Retinitis albuminurica, hemorrhages, and more serious derangements of vision occur only when the kidney lesion is primary. An important symptom characteristic of general arteriosclerosis is a tendency to emaciation and loss of weight, a change of color, a pallor, and loss of vigor which is characteristic. The condition of the arteries interferes with an adequate nutrition and the patient wastes as well as grows weaker and anemic. Dr. Alfred Stengel suggests that this anemia is apparent rather than real, since the blood in the vessels is simply obscured by the thickened vessel walls.

Perhaps the most characteristic difference is found in the blood pressure. In general arteriosclerosis blood pressure may be increased, but not nearly as much as in renal sclerosis when the systolic

[8] Medico-Chirurgical Transactions, 1872, vol. iv, p. 273. Reprinted in a collection of the writings of Sir William Gull. New Sydenham Society, 1904.

pressure is often 170 to 220 mm. as contrasted with an average normal of 145 mm.

An important etiologico-pathological difference is claimed by Gull and Sutton in the kidneys. According to them the destruction of renal tubules is due to the contraction of new connective tissue, the formation of which is due to the arterial changes. In primary contracted kidney the renal parenchyma dies first and is replaced by the connective tissue secondarily.

These instances illustrate two categories of associated renal and cardiovascular disease: (1) That in which the kidney disease is primary; and (2) that in which the renal condition is a part of a general arteriosclerosis. In both classes the cardiac hypertrophy is secondary.

On the other hand kidney disease may be the direct result of heart disease. This starts in and continues largely in a passive congestion caused by the backing of the venous blood into the kidney. It occurs in mitral valve disease, both stenosis and incompetency, myocarditis without valvular lesion, and sometimes also in acute dilatation. The result of the first two is the kidney of chronic passive congestion or cyanotic induration, a well recognized condition, in which there is eventually some overgrowth of interstitial connective tissue with resulting hardening; while the third, acute dilatation, causes an acute passive hyperemia of the kidney. The symptoms of passive congestion when present in mild degree are a scanty dark hued urine of high specific gravity, containing a little more than a trace of albumin, and either no casts at all or a few hyaline casts, more rarely moderately granular. In severe degrees the albumin is much increased, while the casts commonly remain the same kind though increased in number. A few red blood disks may now also be found by the microscope, but there is never enough blood to be visible to the naked eye. It is these cases which are still too frequently regarded as cases of primary kidney disease by the hasty observer, and it must be admitted that the diagnosis is not always easy, at least at the first examination. There is dropsy with albuminuria and casts, three symptoms deemed by many physicians all that is necessary to justify the diagnosis of Bright's disease. The cases which are most difficult to separate from Bright's disease are cases of myocardial disease with failing heart without signs of valvular lesion in which stasis has increased until dropsy and albuminuria have become marked. In these cases of primary heart disease arterial sclerosis is much more rare. The disease is cardio-renal in the strict sense of the term.

The forms of Bright's disease which are most frequently confused are chronic parenchymatous nephritis and such cases of chronically contracted kidney in which hypertrophy has become dilatation and the accentuation of the aortic second sound has grown feeble, while dropsy, a rare symptom in the earlier stages of contracted kidney, has supervened.

The first essential to a correct diagnosis is, therefore, a deliberate examination. The exact condition of the heart must be ascertained in each case, and if a mitral murmur is present, if the urine is scanty, of high specific gravity, even if it contain tube casts, the chances are almost all that it is a primary heart disease. If there is no murmur the difficulty is greater. But even in the absence of a murmur if the clinician will but wait a little while before making a diagnosis he will avoid error. Especially valuable in these cases is the scanty, dark colored urine of high specific gravity. Marked shortness of breath is invariable in any form of heart disease and occurs early, whereas in primary renal disease it is more frequent and occurs later. Most valuable is the information given by the heart sounds. In primary renal disease there is sharp accentuation of the aortic second sound, while in primary heart disease this is wanting, and there is accentuation of the pulmonic second sound. The blood-vessels must be carefully examined and the presence or absence of sclerosis determined, bearing in mind that this condition is much more likely to be present in primary renal disease than in primary heart disease. At the present day no examination is complete without estimating the blood pressure. In primary renal cases of either kind it is commonly high, but higher in primary renal sclerosis; in mitral valvular disease it is low, at least the disatolic pressure is low even though the systolic be high. Fortunate are we if the history of the case from an early stage is available. Too often it is wanting, especially in hospital cases.

A diagnosis is of extreme importance because prognosis is widely different and treatment by no means identical. The prognosis is much more favorable when the heart disease is primary, even when there is extreme dropsy, and I have seen patients improve incredibly even when they have been almost moribund. In the cases referred to of primary contracted kidney with hypertrophy, in which the heart muscle has given way and the hypertrophy has been replaced by dilatation, resemblance is close, but by this time the heart is very much larger than in primary heart disease, in which, too, the enlargement is also to the right, while in primary renal disease the hypertrophy is to the left only. In this condition, too, there remains almost to the very end a certain degree of accentuation of the aortic second sound and the blood pressure continues high, much higher than in mitral valve disease. We may be aided by uremic symptoms. Uremic symptoms are much rarer in the cases beginning as heart disease than in those beginning as renal disease or general arterial sclerosis, indeed very rare. Such symptoms point, therefore, to the latter condition. But I often find that the practitioner interprets as uremic, symptoms otherwise explainable, and sometimes it is not easy to say whether they are uremic or not.

Now as to treatment. To begin with the cases which may be classified as more easy of diagnosis, in which there are signs of

chronic interstitial nephritis, commonly polyuria, small albuminuria, no dropsy, hyaline and pale granular casts not very numerous, hypertrophy of the left ventricle, sclerosed arteries, and high blood pressure, 160 or more mm. of mercury. Are there curative measures? I fear not curative in the strict sense of the term but certainly helpful. Whether the process has started in the bloodvessels as a whole or began in an interstitial inflammation of the kidney, toxic substances have been at work irritating the renal tubules and the intima of the arterioles, impairing the integrity of both. Such substances have arisen from over consumption of any kind of food, but especially proteid foods and alcoholic drinks, perhaps also tea and coffee. These, therefore, must be cut out of the dietary and substituted by milk and cereals and vegetables. If there be constitutional syphilis, it must be treated; if diabetes, the sugar removed from the blood; if gout, the uric acid and purin bodies eliminated. The last is accomplished by excluding proteid substances, including especially glandular organs such as sweetbread, liver, and kidney, which are especially rich in purin bodies. If the patient is overworked mentally or physically he must rest.

Can we remove the sclerosed vessels, overgrown connective tissue in the kidney, and the hypertrophied heart by drugs? I fear not. But we may counteract their effect and perhaps retard their increase. The iodides not only have the tendency to remove overgrown connective tissue but also to act as permanent vasodilators. Vasodilatation is especially desirable. How far it is possible I do not know; indeed, it has lately been denied, but I am in the habit of using the iodides with seemingly good effect. They may act, too, as is claimed by some by diminishing the viscosity of the blood, which may be one of the causes of cardiac hypertrophy. I prefer the iodide of sodium given in doses rarely large but commonly as large as can be borne without disadvantage. My doses never exceed 10 grains three times a day. More frequently they are less, but they must be kept up continuously. When there are retinal symptoms (retinitis albuminurica) I substitute the biniodide of mercury in $\frac{1}{48}$ to $\frac{1}{24}$ grain doses. In spite of this the conditions slowly grow worse, although I think they may be retarded.

As to other treatment, it must consist mainly in combating symptoms. Digitalis is not, as a rule, indicated; indeed it may be harmful. Should the cardiac action become too powerful tincture of aconite in three to five drop doses, three times a day or oftener, will calm the unruly organ, especially if associated with rest and a reduced amount of food. Nitroglycerin, reputed a prompt vasodilator, may be used under the same circumstances in doses of $\frac{1}{100}$ to $\frac{1}{50}$ grain at short intervals, as often as once in two hours, and is sometimes advantageously kept up for a long time at longer intervals. Nitrite of sodium may be given in 3 to 5 grain doses as often. I do not think the nitrites are as satisfactory as aconite when there is powerful

cardiac action. On the other hand, they sometimes produce an aggravation of the symptoms, producing an unpleasant fulness in the head, to which however, the patient soon becomes accustomed.

General massage is a means of treatment which is often beneficial, helping the circulation and easing the work of the heart.

However unsatisfactory the treatment for this class of cases may be, it can be for the most part intelligently directed because the diagnosis, as a rule, has been correctly made. It is not so with the other divisions, namely, those associated with dropsy and large albuminuria and casts, which may be due to valvular disease or myocardial disease, to parenchymatous nephritis or the last stages of chronically contracted kidney. Fortunately the treatment is not widely different; indeed, up to a certain point it is identical. Thus, whichever of the conditions named is present, the patient must be put at rest in bed. This is sometimes difficult to carry out. He has perhaps been sitting up night and day, and imagines he will suffocate if he goes to bed. The bed should, however, be insisted upon, and in twenty-four or forty-eight hours he will be convinced by the results. He should also be put on a milk diet. Here, however, the treatment of the two classes of cases begins to diverge. If the case is one of primary heart disease, liquids should be restricted, although they may still be the best form of food. The patient's tissues are water logged, and we want to reduce the water rather than add to it. Yet I have seen such patients deluged with liquids, because, in the opinion of the physician, it was necessary to pass water through the patient to wash him out and thus diminish the danger of uremia. But this particular patient is not in danger of uremia, and to sluice him with water tends to aggravate a symptom we seek to abate. The liquid ingesta must be cut down. Nay, more liquids must be removed from him. He must be purged with hydragogue cathartics, the best way to get fluid from him. He must be sweated by hot-air or vapor baths or by hot packs, and the secretion of urine stimulated by diuretics if possible.

Here, too, we may expect diuretics of a class to act which in advanced renal disease are useless, viz., diuretics of the theobromin class which act directly on the renal epithelium and require therefore a certain integrity of this tissue for the best results. Of these, besides theobromin and caffein, there are three—diuretin, theocin, and agurin. Theobromin is a drug difficult to dissolve, but, nevertheless, I have seen it produce free diuresis in cardiac cases—given in simple admixture with water in doses of 45 grains in twenty-four hours. Pharmaceutical chemists have therefore sought to produce soluble compounds of this substance. Such are diuretin, agurin, and theocin. Caffein is a good representative of this class and has the advantage of being a cardiac and cerebral stimulant also. It is a soluble derivative of the xanthin bodies, a trimethylxanthin, while theobromin is a dimethylxanthin and is insoluble. I have used caffein

with great advantage in conjunction with digitalis and its congeners which act by increasing blood pressure and which are suitable for both renal and cardiac disease. A favorite treatment with me in such cases is to alternate digitalis and caffein, especially caffein sodio-benzoate, giving each every four hours, alternately, suiting the dose of each to the case; say of tincture of digitalis 5 to 10 m nims, and of caffein citrate 3 to 5 grains. The citrate of caffein must be given in larger doses than caffein, one-third larger. Caffein sodio-benzoate is suited for hypodermic use. Of late I have been substituting the fluid extract of digitalis for the tincture.

Theobromin has the advantage of being more prolonged in its action than caffein, but it is not so well borne by the stomach. The same is true of diuretin, a soluble combination of theobromin (50 per cent.) with salicylate of sodium. Diuretin is also an uncertain drug. Two or three years ago I received from a medical friend in Boston a useful hint on the use of diuretin. He informed me that as found in the shops it is often inefficient because spoiled, in which event it makes a turbid solution. The drug should therefore be thus tried, and if it does not dissolve in clear solution it should be discarded. On the whole I have been rather disappointed in diuretin, whose effect is moreover temporary and in my experience taxes the stomach severely. It is given in doses of 5 to 15 grains three to four times daily.

A far better derivative of theobromin is theocin or theophyllin or dimethylxanthin sodium. Theocin is an alkaloid which exists in small amount in tea leaves, discovered by Kossel in 1888. The quantity is, however, so small as to be unavailable. It has therefore been produced synthetically by Bayer, who also makes a soluble double salt of acetate of sodium and dimethylxanthin, acet-theocin sodium or soluble theocin, a preparation more efficient and less irritating to the stomach. It is given in doses of 4 to 8 grains three times daily for an adult, in solution or tablet form, or half as much twice as often. When successful prompt diuresis results, the urine increasing to 70, 80, 100, or more ounces daily. As compared with theobromin again its effect is less persistent, and with caffein it lacks the effect of cardiac stimulation. Another preparation which seems to differ only in the quantity of dimethylxanthin is agurin, with which I have as yet had no experience although it is an older remedy than theocin. All these remedies require a certain degree of integrity of the kidney and are therefore much more efficient in primary heart disease than in primary kidney disease; in fact, they are of little or no use in advanced renal disease, whence their inertness has some diagnostic value.

As to the withdrawal of liquids you may ask, How is this accomplished by a milk diet? I answer, by restriction of the amount ingested; easier done with milk than any other shape of food, while it is moreover in an easily assimilable shape. We may begin with

2 ounces every two hours, which will make but 24 ounces in the twenty-four. Such a patient is not hungry and will not cry for more. Nor is he in danger of starvation. He will feed on his serous effusion and in a few days he will begin to be hungry. I have frequently noted the beginning of happy results when the patient begins to be hungry. The serous effusion will start to disappear. Before this, however, the tension should have been removed by purgatives and sweats and the secretion of urine in increased quantity have set in. Even in cases of pure renal origin I think the matter of fluid ingestion is sometimes overdone, and I have had to insist on the restriction of liquid in these cases in order to remove dropsies and effusions.

It may be necessary even to add to these measures incision of the legs or the use of Southey's tubes in order to facilitate the extraction of liquid from the tissues. I prefer the former. The better method is to make a single incision an inch long behind each ankle rather than to make more numerous and smaller incisions throughout the leg. Enormous outflow of fluid is often thus secured, while the relief to tension favors the action of the diuretics.

Supposing the renal changes to be primary in these water-logged cases, the form producing these symptoms is most frequently chronic parenchymatous nephritis. The difference is greater in prognosis than in treatment, the former being much more grave. The success in the treatment of the variety just described depends almost entirely on the degree of integrity of the kidney which remains. The rest and diet are the same. The measures to relieve tension and remove the anasarca are the same as to purgatives and sudorifics, but the class of remedies so useful in producing diuresis and in stimulating renal action is comparatively useless, and the drugs which increase cardiac contraction and favor osmosis are most useful, that is as representing the former, digitalis and strophanthus, given in full doses and the same doses for each, 10 to 15 minims. It should be remembered that the infusion of digitalis is often in these cases more efficient than the tincture. Broom is another diuretic which sometimes acts very well. In times past broom tea was found efficient, but fell into disuse because of its bulkiness and disagreeable taste. It has been replaced by its active principle, spartein, in the shape of the sulphate. Many years ago I began to use spartein in the dropsy of Bright's disease and thought I was giving quite large doses when prescribing $\frac{1}{4}$ grain with such frequency as to secure two grains in the twenty-four hours. They were certainly much larger doses than heretofore griven. Now I advise it in even larger doses, $\frac{3}{4}$ grain every three hours. I have never known any harmful result and it is well borne by the stomach.

As representing the salines or osmosis promoters, the citrates, tartrates, and acetates are indicated and may sometimes be advantageously combined with cardiac stimulants in the same prescription. Purgatives and sweats are also necessary in these cases. Purga-

tives are especially useful also from the standpoint of eliminators of toxic solids, which the kidneys are helpless to remove, as well as water, von Noorden's experiments having shown that urinary toxins are very much more freely removed by the bowel than by the skin, and thus uremia is averted. Of aperients, every one knows that the hydragogues are indicated, including especially salines, compound jalap powder, and elaterium.

In this connection I will allude to a drug which I think merits more frequent trial, a purgative and diuretic so striking in its effect at times as to have received the name of internal trocar, and that is, apocynum cannabinum, the root of the Canadian hemp. Only recently a friend informed me that in a given case he found it so active as to cause the patient to pass a bucketful of urine in a given night. Unfortunately it is sometimes so irritating as to produce vomiting as well diuresis and purging. An active principle known as "apocynin" is less irritating. It is put up in $\frac{1}{6}$ grain granules, of which 3 are given every two hours until the effect is secured.

We must not forget an old but still excellent diuretic and eliminator sometimes producing magical effects, namely, the pill of calomel, squills, and digitalis, in doses of calomel, $\frac{1}{2}$ grain; of squills, 1 grain; and of digitalis, 1 grain, three or four times a day. I have known a dropsy which has resisted other measures to disappear with rapidity. The purgative and diuretic effect are commonly both secured. Here again it is in the anasarca of primary cardiac cases that we have the best results, although they are sometimes obtained in renal cases also.

These measures will cure a number of milder cases and once in a great many times the severer will yield. When this is the case there must be a considerable remnant of the kidney intact or nearly so. It used to be said that if we can keep our patient alive until the stage of contraction is reached his chances of prolonged life are improved, but I have of late years doubted whether this is true. In the contracted stage there is less secreting structure than in the parenchymatous stage. In this variety the danger of uremia is greater, but not nearly so likely to present itself as in contracted kidney.

Most important to remember is the fact that a diuretic which answers in one case often fails in another, and it is therefore necessary to have a full quiver of remedies to be drawn upon judiciously as needed.

It may be expected of me to say something of the influence of chloride retention upon œdema and albuminuria. Strauss in Germany and Widal and Javal in France, in 1902 and 1903, called attention to the fact that there is an abnormal quantity of sodium chlorid in the tissues of persons affected with dropsy, reporting cases in which it was possible to cause œdema to appear and disappear almost at will by varying the amount of chloride in the diet. The

rationale of these events is supposed to be as follows: In nephritis the ability of the kidney to excrete chlorides is decreased, whence their accumulation in the tissues and the consequent accumulation of water in the same tissues in order to keep the chloride in solution. Although there appear to be exceptions and the parallelism is not always demonstrable, the truth in general of the statement seems to be admitted. An opposite theory, that the primary trouble in nephritic œdema is the retention of water to which the retention of salt is secondary, is not sustained by the weight of evidence, which goes to show that the chloride retention is primary and the water retention secondary. Chloride retention has been observed in some cases of cardiac dropsy and in some cases of œdema occurring in patients with inflammatory disorders, but there is no evidence to show that there is any causal relation between the two conditions or that the chloride retention is more than can be explained by the retention of fluid in the œdematous parts.

As to the treatment of renal dropsy growing out of these facts, it would naturally consist in the elimination from the diet of food rich in chlorides, which enables the kidney to remove with ease the remnant remaining in the tissues. It is advised to reduce the chlorides ingested to 2 or 3 grams daily. This is accomplished by a diet including eggs, unseasoned meat, unsalted butter and milk, bread without salt, fresh-water fish, potatoes, rice, fresh vegetables, fruits, and chocolate.

THE TREATMENT OF PNEUMONIA, ESPECIALLY BY OUTDOOR AIR.

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In 1906 there were treated in the Presbyterian Hospital in New York 128 cases of acute lobar pneumonia. The patients were of every age and the cases were of every sort, many of them alcoholic, and many constituting the terminal factor in chronic diseases of necessarily fatal type. An interesting fact is that among the recoveries were 47 patients (or 36.7 per cent. of all the cases) who received absolutely no medicinal treatment whatever, except the occasional laxative which any bedridden febrile patient may require. No cardiac stimulants were given, no hypnotics, no vaso-dilators, no inhalations, no empirical remedies. These patients were for the most part treated with good fresh outdoor air throughout their entire illness. They were placed either upon a roof or in small rooms where the artificial ventilators were sealed up and the heads

of their beds set at the windows, kept wide open day and night, often with the thermometer below 35 or 40° F. I commend such facts to those who are addicted to writing articles for medical journals entitled "Ten cases of lobar pneumonia with nine recoveries, all treated by large doses of quinine," or nitroglycerin, or digitalis, or cold compresses, or guaiacol carbonate inhalations, or what not. I, too, have faithfully tried all these and many other "systems" of treatment in this disease, year by year, with the growing conviction that the only rational treatment of lobar pneumonia is the symptomatic one. Not all patients need digitalis, because not all have weak hearts; not all need aconite or nitroglycerin, because not all have initial high tension and full arteries; not all need poultices or ice-bags, or cold compresses, because not all have local pain. It is well enough and time enough to employ such remedies in any special case when the need arises, but never with the idea that the natural progress of the disease can be uniformly modified, much less aborted by them. But what every pneumonia patient does require is a plentiful supply of flowing fresh outdoor air which has never been in the lungs of anyone else, as ward air and room air always has been, and which has not been heated or *roasted* until it has lost all power of invigoration. In order to deliver furnace heat in a room, or air hot enough to warm a large ward, such air must previously have been cooked over hot pipes or steam coils, often to a temperature of 300° or 400° F., so rapidly does it lose temperature in its conduction through long ducts and by mixing with the air of the room. In the Presbyterian Hospital, for example, I found that all the ward air in winter supplied by the "closed ventilation" system was previously roasted in the basement to 400° F. One would not feed a patient with scurvy upon sterilized milk, nor a patient with anemia upon canned vegetables, and why feed a patient with the extreme air-hunger of pneumonia upon baked air?

Moreover, it was found by analyses made for me by C. G. L. Wolf that in those same wards after twenty visitors had been admitted for an hour with four nurses and two doctors, the carbonic acid content rose to 5.13 parts per 10,000 as compared with the normal 4.06 parts in the fresh air outside, an increase of 20 per cent. In any private room in winter with a very ill pneumonia patient there are also usually two nurses, one or more of the family, and the physician, all of whom by frequent visits share in breathing the air which has been already superheated. One finds such rooms in which, with windows tight shut, canned oxygen is being constantly liberated, after it has been superheated and confined for some time in a metal receptacle and finally blown through stale water and an unpleasant rubber tube. I formerly advocated its employment myself, but it is so much cheaper, simpler, and better to open the window. In round figures the normal atmospheric air contains 20 per cent. of

oxygen, of which only 5 per cent is removed by the red blood cells in respiration, which are practically saturated with oxygen under normal conditions of atmospheric pressure. The remaining 15 per cent., of atmospheric oxygen is returned *unused* in the exhaled air. Canned oxygen differs from air in that the 80 per cent. of nitrogen of the air has been replaced by oxygen. But if there is already a margin of 15 per cent. of oxygen in fresh air, or three times the actual need of the organism, what is the object of adding more? The normal saturation of the red blood corpuscles prevents their carrying any more oxygen, nor can the plasma absorb it under conditions of normal atmospheric pressure. What canned oxygen may do is to replace some of the vitiated air that overzealous friends or nurses pollute about the patient's bed. Hence it may be worth five dollars a can when they cannot be kept at a distance and will not allow the window to be opened for fear of a "draught." But the patient's chances of life are all on the side of fresh air. If he be entirely outdoors, on a balcony or roof, there is no "draught." If he be at an open window there is less danger of a draught the wider it be open, that is, of a chilling current of rapidly moving air. If he be wrapped up, as he should be in cold weather, precisely like a tuberculous patient, with extra blankets, a hot water bottle to the feet, and a woollen hood closely enveloping his head, no draught will ever harm him.

In such treatment of pneumonia I have learned to discard the "draught" as a bogie born of prejudice and inexperience. When the bowels are to move or when hyperpyrexia requires a cold pack, which latter seldom occurs with patients treated outdoors, they are temporarily moved into the ward.

In the wards of Bellevue Hospital is found what is probably the largest alcoholic pneumonia service in the country, because the service is given over to the sick poor, not a few of them being the lowest type of diseased, underfed, and more or less chronically drunken emigrants. The buildings are ninety years old (although new ones with verandas opening off every ward are in process of construction). The main buildings are faced with balconies intended originally for fire escapes, but large enough to accommodate a number of ward beds. For the past few seasons it has been my constant practice to treat all pneumonia patients as far as practicable by moving their beds out on to the balconies through the ward windows, which are cut down to the floor. The results have been most gratifying. It is the universal testimony of the nurses that they have much less "nursing" to do, the patients are so much quieter, less actively delirious, or less complaining, and they sleep so much better. It is the universal testimony of the patients themselves as their mental state improves, that they feel better outdoors. When they are necessarily returned to the ward for special reasons, or because the service is so overcrowded that they must give place to the

more seriosuly ill, they often beg to be returned to the outdoor air. When we cannot place them on the balconies we place the beds by open windows and keep off the ward air, as far as possible, with screens. The balcony floors are of wooden slats, and sometimes, last winter, we had to place rubber sheets over the beds to protect them from the drip of melting snow above. Sometimes it was so cold that the sputum froze in the cups.

In not a single instance, in either of the hospitals to which I have referred, have I had cause to regret the open air treatment, or known any difficulty to arise from it. At Bellevue Hospital I hesitated at first for fear some delirious patient might leap off the fire escape, as they often attempt to leave their beds in the wards, and there is an insufficient number of nurses to watch them at every moment. I therefore had protective wire nettings put up (heavy tennis netting). The nurses and house staff soon learned, however, that the patients who were actively delirious in the wards, become so much quieter after a short interval in the open air, without hypnotics, that we now seldom hesitate to leave them temporarily by themselves. They are also less restless, less cyanosed, and sleep much better.

It is not claimed that the open-air treatment of pneumonia is always curative by any means, but it often is, and the advantages above enumerated are not only very great, but are uniformily obtainable. In alcoholic subjects especially it is found that much less stimulation is required, and it is often possible to do without it altogether. Formerly I gave large quantities of alcohol in cases of pneumonia in alcoholic subjects, anticipating delirium tremens, but now I rarely find it necessary to employ it at all. Neither is it claimed that *every* patient having pneumonia should be placed at once in the open air, no matter what the weather may be. As in every other form of treatment there are cases in which routine is undesirable, such as may arise among the very aged or very feeble marasmic infants, or patients having serious cardiac disease; in other words, asthenic cases with low temperature reactions. But even among this type benefit is often obtained, and the principle is the same, although modifications as to air temperature or other precautions may be desirable. It is not necessary that the air temperature should be cold, but fresh, that is, *uncooked* it should be always. Moreover, the natural changes in air temperature and moisture, as between night and day atmosphere, possess undoubted physiological value for those in health, which is missed in a monotonous climate. How much more are they missed by the cyanosed, dyspnœic patient compelled to breathe cooked air at the same temperature day and night. Many a chapter upon the hygiene of the sick-room begins with the fallacious postulate, "The air of the room should be kept uniform at 68° or 70° F.;" that is, the air may be ever so "stuffy," the nurse may have breathed

it before the patient, it may have no vitality whatever, but if the thermometer declares it to be of the correct temperature, it goes! How much more reliable a guide is the educated and appreciative nose than the thermometer!

It is no new principle which is enunciated herein. From time to time for many years the open-air treatment has been advocated for pneumonia as well as for many other diseases, but it becomes desirable at times to restate old principles in the light of new experiences, and I submit that the physician, not the architect, is the proper person to treat pneumonia. The architect arranges elaborate "closed ventilation" artificial systems, automatic thermostats, and all manner of appliances and structural devices in hospitals and houses for the maintanence of uniform temperature. The physician disregards routine, opens the windows, vivifies the air, permits the patient to have the same advantages of natural air changes when he is ill that he may have when he is up and about, and even rescues him from the architect altogether by placing him sometimes outside the house. As Walter B. James has said, in writing of this subject, "The time is soon coming when the hospital roof will be defined simply as 'the floor of the top story.'"

In order not to be misinterpreted as an advocate of a "fresh-air crusade" I would add that when patients with pneumonia have very weak hearts they should have digitalis, irrespective of theoretical considerations as to intrapulmonary blood pressure; when harassed by cough they should have codeine (heroin being too depressing); when distressed by pleuritic pain they should have codeine and a poultice too, if they wish it, or an ice-bag if that gives more relief, for neither makes the slightest modification in the natural progress of the disease, because neither heat nor cold superficially applied reaches the deep-seated area of inflammation.[1] When the patients have insomnia they should have trional, as being a non-depressant hypnotic. If they have alcoholic delirium, they are best controlled by paraldehyde, or, in grave emergency, hyoscine, but morphine is to be avoided if possible, as small doses occasionally produce overwhelming results in pneumonia. For hyperpyrexia (104.5° + F.) they should be given cold sponge baths, and for sustained very high temperature, cold packs. For pulmonary œdema they should be cupped and given atropine hypodermically. Tympanites should be avoided as a very menacing symptom, because not only is the natural freedom of the diaphragm restricted and breathing seriously interfered with, but intestinal autointoxication is added to the pneumonic toxemia. Hence the desirability of using purgatives, enemas, intestinal antifermentatives such as salol, and turpentine stupes, whenever this most serious complication threatens. It is well also temporarily to remove milk from the dietary, as in typhoid fever

[1] See the writer on "Local Thermotherapy," New York Medical Record, April 13, 1907.

with tympanites. Abundant water should be drunk to promote elimination, and the ordinary diet should consist of soups, broths beef juice, eggs, farinaceous gruels, and milk. Oranges and weak coffee may be taken.

With this simple but effective armamentarium one may deal satisfactorily with the greater number of the more serious cases of pneumonia, but it will be found that much of it, simple as it is, may be unnecessary if the patient has continuous access to fresh free flowing air.

THE LENHARTZ TREATMENT OF GASTRIC ULCER.

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Although Lenhartz, in January, 1904, published his results of treating gastric ulcers by feeding without a preliminary period of starvation, this method has not appealed to the profession generally. The older plan of combining starvation and gastric rest with rectal feeding, as a prerequisite to a course of graduated milk diet, has held its time-honored preëminence.

This accepted method of treatment could almost be called classic, for it received its first impulse from Cruveilhier at the time of the modern awakening of medicine, and its development has been associated with the names of such masters as Ziemssen and Leube. This older method still retains its hold on the practitioner both because it fulfils the seemingly rational indications to give an open wound rest and to substitute an efficient means of nourishing the patient while the normal food supplies are contra-indicated, but also because it cures if efficiently carried out a very large majority of the patients even if their symptoms are severe and accompanied by profuse hemorrhage and its resulting anemia.

The cases which form the basis of this study are few in number, but so striking in results, that a judgment on the Lenhartz treatment seems justified. They include 5 cases of ulcer of the stomach and 3 cases of hyperchlorhydria, probably unassociated with ulcer. They are from the records of the New York Hospital.

The routine treatment of gastric ulcer at the New York Hospital has been, for many years, to carry out the old systematic cure of Ziemssen and Leube. The results have been good, but the occurrence of the 2 following cases led to a trial of the Lenhartz treatment, with the results which are given here. The first of these cases to present an unusual complication is, in brief, as follows:

The patient was a well-developed man, a carpenter, and came

under treatment December 27, 1905. He was prostrated by heat six months previously (July 18), and ever since had suffered from attacks of vomiting with intense pain in the stomach. Attacks follow the taking of solid food. Patient has been on a diet of raw eggs, stale bread, and milk almost continuously for four months. Weighs 157 pounds, a loss of 13 pounds from top weight. He is constipated and has never vomited blood or seen tarry stools. Physical examination showed normal heart and lungs, a palpable spleen, and a stomach splash to navel; there was no pain or tenderness, but the right abdominal rectus was distinctly resistant. Blood and urine examinations were normal, the stools showed "occult" blood, and an Ewald test meal showed a free HCl of 30, a total acidity of 50, and there were no evidences of gastric stasis.

The patient was put on a routine ulcer cure and fed by nutrient enemas of peptonized milk and eggs. This was continued, with gastric starvation, except for water, for thirteen days. Gastric feeding, with peptonized milk, was begun, and by the twentieth day of treatment the patient was taking eight ounces of milk every four hours. On this day he developed a purpuric rash on both legs, with pains and with spongy, bleeding gums. The ulcer cure had developed a typical attack of scurvy. Under proper and rapidly increasing diet the patient made a good recovery and remained well and cured of all symptoms two months later.

The second patient presented the complication of continuous small hemorrhages in spite of the starvation and the gastric rest of the classical cure. The history of this patient during the first two weeks of her stay in the hospital is as follows:

Mary K., single, aged thirty-two years, domestic, was admitted June 28, 1906. After seven days of rectal feeding and gastric starvation, and a subsequent seven-day period of very moderate gastric feeding with fully peptonized milk, she continued to have occult blood in the stools, had a hemoglobin percentage of 39, and presented the therapeutic problem whether to continue medical treatment or to resort to surgery, with the idea of doing a gastro-enterostomy. Before resorting to surgical interference, it was decided to try a Lenhartz course, which resulted in a cure, as shown in the detailed history of Case I below.

The Lenhartz treatment is based upon the principles, first, to furnish nourishment and improve the patient's general condition, and thus favor the better healing of the ulcer; second, to prevent distention of the stomach both by careful limitation of size of each food portion and of the fluids taken, and by the use of ice applications externally; and third, to prevent the action of the excessive HCl content on the ulcer surface by combining it with food albumin and by the use of bismuth subnitrate internally.

These indications of the Lenhartz treatment are accomplished by fulfilling the following conditions: First, to continue to nourish

the patient by feeding by the stomach; second, to use concentrated foods, rich in albumin, for this purpose, in order that the acid of the gastric juice will be rapidly combined with the food proteid; third, the exhibition of the food in small amounts at short intervals of one hour; fourth, the insisting on slow mastication and slow eating, which is best accomplished by feeding the patient by teaspoonful amounts to each mouthful, and by never allowing him to feed himself during the whole two weeks' period; fifth, to insist on a three to four weeks' rest cure in bed; and, sixth, of course other medicinal procedures are allowed if indicated, for example: an ice-bag to the epigastrium and bismuth subnitrate internally for hemorrhage, enteroclysis for the effects of hemorrhage, and iron and arsenic for the anemia. The routine course of treatment covers two weeks' time, and includes the following articles of diet, which are prepared as here detailed: Fresh milk, iced; raw eggs, the whole egg is beaten up and iced; both the milk and the egg are prepared in a covered glass tumbler, surrounded with cracked ice, and kept at the bedside. The feeding spoon is also kept iced in the same manner. The only change in the early routine consisted, if the patient preferred, in mixing the eggs and milk and feeding the mixture, instead of the hourly alternation as prescribed by Lenhartz. Granulated sugar is added to the eggs after the third day. The raw scraped beef, boiled rice, and zwiebach are prepared in the usual manner. Cooked chopped chicken was substituted in these cases for the raw ham of the original Lenhartz dietary, to conform to the taste of the patients treated; and, finally, butter is a prominent article of diet.

The following changes were also permitted from the strict rules of Lenhartz, and after the tenth day broiled chop, beefsteak, or chicken was substituted for the raw beef, and ice-cream was added during the last four days in several cases The zwiebach was changed to toasted bread, and other cereals took the place of rice during the same period.

Up to the tenth day a strict adherence to the routine was insisted upon, both in regard to the amounts of each article of diet and to the feeding intervals, and also to the totals of each article for each daily ration. The food was given in hourly intervals during ten days from 7 A.M. to 9 P.M., and a complete rest was allowed during the night for ten hours. The iced foods were prepared in small quantities as needed. The daily schedule, with amounts of each article of diet, is as follows:

Day.	*Eggs.*	*Milk.*	*Sugar.*	*Scraped Beef.*
I.	2 drams each dose; total, 2 eggs.	4 drams each dose; total, 6 ounces.		
II.	3 drams per dose; total, 3 eggs.	6 drams per dose; total, 10 ounces.		
III.	Half ounce per dose; total, 4 eggs.	1 ounce per dose; total, 13 ounces.	20 grams added to eggs.	
IV.	5 drams per dose; total, 5 eggs.	1½ ounces per dose; total, 1 pint.	"	
V.	6 drams per dose; total, 6 eggs.	14 drams per dose; total, 19 ounces.	30 grams.	
VI.	7 drams per dose; total, 7 eggs.	2 ounces per dose; total, 22 ounces.	40 grams.	36 grams in 3 doses.
VII.	4 drams per dose; total, 4 eggs. Also, 1 soft-boiled egg every four hours; total, 4 eggs.	2 ounces per dose; total, 25 ounces.	40 grams.	70 grams with boiled rice, 100 grams in 3 doses.
VIII.	"	2½ ounces per dose; total, 28 ounces.	"	"
IX.	"	3 ounces per dose; total, 1 quart.		Beef same. Rice 200 grams, Zwiebach 40 grams in two portions.
X.	"	Add cooked chopped chicken 50 grams, also butter 20 grams.	"	"

XI–XIV. Interval of feeding made two hours, milk given in 6-ounce doses with ½ ounce of raw egg. Butter increased to 40 grams and various additions made, as detailed above.

The 5 cases of gastric ulcer which were treated by the Lenhartz method presented positive evidence of hemorrhage at the time of beginning treatment, and should be classified as belonging to the severe type of the disease. Four of the patients presented a marked anemia from loss of blood, and the hemorrhage continued for eight, twelve, thirteen, and twenty-one days after beginning treatment. In spite of this the routine was persisted in because of the success in the first case tried. Each case presents some point of special interest.

In Case I the limit had been reached of a course of medical treatment of fourteen days, organized on the old plan. The patient's condition would not permit of a renewal of the starvation period nor would the bowel tolerate a return to a strenuous course of colonic feeding. It was a serious question if surgical interference did not offer the only relief possible. The improvement under the Lenhartz cure was more rapid and more satisfactory than a mere study of the written record with its positive blood reaction in the stools for twelve days and its slight rise of only 4 points in hemoglobin for the same period would lead one to infer. The patient lost her anxiety and became calm and contented. The very evident daily increase in her diet had a most soothing effect on her mental

condition. She felt and knew she was getting well. She has remained well and has had no stomach symptoms.

Case II presented a second attack of hematemesis; the first attack had been treated surgically by the excision of a part of the stomach wall, which was about two inches square and contained five or six bleeding points. No gastro-enterostomy had been done at that time. The Lenhartz cure was complicated by a personal distaste on the part of the patient for the milk and raw-egg diet even to the point of nausea and vomiting, which was controlled by magnesia internally, an ice-bag to the epigastrium, and by one period of twenty-four-hour cessation of the cure. Except for this the recovery was steady, and the patient left the hospital on the thirty-fifth day, free from gastric symptoms. She has remained well and has been at work continuously ever since.

Case III presented on admission a marked anemia, large tarry stools, a febrile action ranging from 100° to 104° for seven days, a distinctly evident irritation of the peritoneum and an inflammatory blood. The white cells counted 16,200 to 22,800 and the polymorphonuclear percentage ranged from 83 per cent. on admission to 75 per cent. on the eighth day of observation. The question of perforation of an ulcer with the necessity of a surgical emergency operation was present throughout the whole first week of treatment. The Lenhartz treatment was begun at once, and, combined with the needed stimulation, brought the patient back to a less critical state at the end of a week. The stimulation consisted of strychnine and digitalone hypodermically, notwithstanding the existing hemorrhage. This patient was kept in bed four weeks, and was discharged from the service on the forty-first day after admission. At present the patient is well, has gained weight, and has no stomach symptoms.

Case IV might be characterized as a routine case of the severer type. The hemorrhages did not cease until the thirteenth day, and the hemoglobin fell to 19 per cent. In spite of these evidences of a lowered vitality, the patient felt well and took his routine food with appetite. This patient reached a point quite below that usually set as a safe one for the performance of abdominal surgery and yet he made a good recovery. Now he is in good health, but eats irregularly, often hurriedly, and suffers occasionally from a burning pain in the epigastrium.

Case V presented a condition similar to that of Case IV. She was admitted suffering from a severe gastric hemorrhage, with low hemoglobin (20 per cent.), tarry stools, and temperature of 102°. The patient made an excellent recovery and was practically well on the twenty-second day of treatment, when she began to show an increasing febrile action. She developed typhoid fever which ran a typical course with relapse. It must be considered a very favorable fact for the Lenhartz treatment that no gastric complications

arose in this attack. The patient was finally discharged after sixty days of hospital care, cured of both the gastric ulcer and the typhoid fever. She has worked continuously from the day of discharge from the hospital, has gained over ten pounds in weight, has no stomach symptoms, and feels better than at any time in her life.

The course of the progress in these 5 cases may be seen in the following table, which shows the time of the disappearance of blood from the stools, the gain of weight, and the gain in hemoglobin content of the blood:

Case.	Stools first free from blood by chemical test.	Weight first out of bed.	Weight on discharge.	Hemoglobin percentages.			
				On entrance.	Lowest observation.	At end of routine cure; 14 days.	On discharge
I	12th day	95	109	38	36	44	66
II	Never found . . .	125	126	85	83	83	90
III	21st day (very faint after 16th)	101	108	46	34	40	75
IV	13th day	123	129	29	19	33	58
V	8th day	no observations	no observations	20	20	34	54

The Lenhartz routine was applied in the treatment of three other patients who suffered from an hyperacid secretion, but who probably did not have a peptic ulcer.

The first of these, Case VI, was an uncomplicated case, with pain and vomiting. He was discharged on the seventeenth day of treatment, just three days after the end of his Lenhartz cure. The diagnosis of ulcer in such a case might seem justified by the facts, but the rapid cure and absence of symptoms during treatment would rather tend to a diagnosis of simple hyperchlorhydria, in spite of the blood found in the test meals. Lenhartz has suggested that such cases of possible ulcer without hemorrhage be given a shorter course of treatment, and that the dietary regimen be begun on the fourth to sixth days of the regular cure. This patient six months later was perfectly well and had no trouble with his stomach

The 2 remaining cases present serious complications of stenosis of the pylorus, one a mechanical benign stenosis and the other a functional stenosis. Both gave the symptom complex known as gastrosuccorrhea.

Case VII presented a dilated stomach and hyperacidity, but with no retention of food after the period of night fasting. The analysis of the fluid taken from the fasting stomach showed a free HCl of 24, a total acidity of 50. She was very neurasthenic and difficult to manage, and up to the time of beginning this treatment

lost both weight and strength. Under the Lenhartz routine, which was brought to a successful end, and after ten days of after-treatment, the patient gained thirteen pounds in weight and eleven points in hemoglobin. The only symptom remaining at the time of discharge was a slight morning nausea. After four weeks the patient left the hospital, but returned two months later with a lesser attack of the old symptoms. The vomiting was the prominent feature of her relapse, and has persisted to some extent ever since.

Case VIII gives all the classical symptoms of a benign stenosis of the pylorus due to adhesions. The patient had been in the surgical service at intervals during the previous five years. He was first operated on for chronic appendicitis and a catarrhal appendix was removed. He gave at that time symptoms of gastric stasis of two and one-half years' duration. Three months later he was re-admitted for dilated stomach, due to pyloric stenosis and tuberculous peritonitis. A posterior gastro-enterostomy was done. Fourteen months later he returned to the hospital with the same symptoms, and an anterior gastro-enterostomy was done. One year later he was operated on again, and many peritoneal adhesions were broken up. On admission to the medical service his free HCl was 56, total acid 72, and he had been vomiting continuously for three weeks. The Lenhartz treatment was complicated by vomiting attacks, but he was discharged on the twenty-seventh day after beginning the cure. A test meal at the end of the treatment resulted in a free HCl of 22 and a total acidity of 56. After leaving the hospital he was comfortable at first on a diet of meat, eggs, and bread, taken in frequent small meals. But two months later his symptoms had returned and he was re-admitted to the hospital. A gastric examination showed stasis, a gastrosuccorrhea, and a hyperacidity. The fluid from the fasting stomach had a free HCl of 33, a total acidity of 52, and an Ewald test breakfast had a free HCl of 47 and a total acidity of 66. A second Lenhartz cure was given and he was discharged after twenty days' treatment. When seen six months later he weighed 135 pounds (a gain of 37 pounds in all). He had been working steadily for three months; he is on small frequent meals of a selected food and wears an abdominal belt.

This group of cases includes only 8, but they are all of the severer type. They all were benefited by the treatment, and, except the cases with stenosis, they all were cured. One patient was cured after a distinct failure of the older treatment. One patient recovered from very threatening symptoms of an impending rupture of the ulcer. The fact that no failures are recorded in this short series, and that at least 2 patients were kept free of surgical interference, do not warrant the conclusion, however, that the Lenhartz cure is infallible. It is far from being a miraculous cure, and it will never entirely eliminate surgery from the treatment of gastric ulcer. Lenhartz would limit surgical treatment of gastric ulcer to cases with

stagnation of food and to those with perforation, peritonitis, or subphrenic abscess. But further experience will undoubtedly find some failures, and surgery will still find its application in a broader field in this disease than would be given to it by Lenhartz. This cure would seem to have a special use in cases with low hemoglobin, which are bad subjects for surgery, even if operative interference is needed later for continuing hemorrhages, for relapses of ulceration, or for the single indication of Lenhartz (motor insufficiency).

This series does warrant the conclusion that the original claims of Lenhartz are correct: First, that the cure is at least equally as efficient as the older method, and that it does not deplete the patient; second, that the cure is more rapid as well as more certain; third, that the vomiting and bleeding stop more quickly and relapse less frequently than in the Leube cure; fourth, that the pain ceases promptly and that morphine is never needed; fifth, that the food supply is sufficient throughout; sixth, that it is possible to treat the anemia earlier with iron and arsenic than in the Leube cure; and seventh, that it is possible to return to a full diet and to the patient's usual occupation earlier than in the older cure.

THE DIAGNOSIS AND TREATMENT OF THE GASTRIC NEUROSES.[1]

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Nothing is more common among our patients than a complaint of "stomach trouble." Again and again this is the answer given when they are asked what brings them for advice. The frequency of this complaint has impressed itself upon me throughout a number of years in both private and dispensary practice. To determine more accurately the proportion of cases in which it is the chief item in the history, I have recently reviewed the records of all the cases seen in the Medical Clinic of Cooper Medical College from January 1, 1900, to January 1, 1906. During this time there came under observation 4232 cases; and of this number I find that 574 have given "stomach trouble" as the complaint that led them to seek advice. Of course it is well understood that the patient's complaint does not always indicate the site of disease; and yet it is interesting to note that a large proportion of patients are thus shown to have trouble with their digestion

[1] Read at a meeting of the Nevada State Medical Society, at Reno, Nevada, October 8, 1907.

In the sifting of these 574 cases of self-labeled "stomach trouble" we have been able to distinguish four groups: (1) Cases in which the symptoms were really due to disease of other than the digestive organs; (2) cases in which the symptoms were due to disease of the digestive organs, but to organs other than the stomach; (3) cases in which the symptoms were actually due to organic disease of the stomach; and (4) cases that could only be classified as gastric neuroses.

GROUP I. In this group we found the stomach symptoms distinctly attributable to heart lesions in 10 cases, to chronic nephritis in 8, to pulmonary tuberculosis in 8, to chlorosis in 5, to arteriosclerosis in 3, to diabetes in 1, to pregnancy in 1, to secondary anemia in 1, to angina pectoris in 1, and to malaria in 1. In this group, therefore, in which the symptoms of stomach trouble were really due to disease entirely outside the digestive tract, there were found altogether 39 cases.

GROUP II. Cases in which the symptoms of dyspepsia are produced reflexly, by disease of digestive organs other than the stomach, are even more frequent than those in Group I. We found a large number of cases in which the symptoms could be best explained by the chronic constipation that accompanied them and best removed by correcting that disorder. Of such cases, in which the bowels would not move for several days in succession, and in which the chief complaint, nevertheless, was of the stomach, we found 43. In 8 other cases the stomach symptoms were distinctly due to cirrhosis of the liver; in 2 to cholelithiasis, in 1 to enteroptosis, in 1 to appendicitis, and in 1 to pancreatic cyst (diagnosis confirmed by operation). Thus, there were in this group 56 cases altogether. The most significant fact of all, which seems worthy of special emphasis, is the frequency with which complaint of "stomach trouble" has been found on examination to be associated with no discoverable change in the stomach, but disappears entirely with the relief of chronic constipation.

GROUP III. It is a matter of surprise to find that a comparatively small number of the patients whose chief complaint is of the stomach really give evidence of organic disease of the stomach when careful examination of the organ is made. We have been able, however, to make the following diagnoses with certainty: chronic gastritis 55 times, cancer 37, ulcer 10, dilated stomach 2, in all 104 cases of organic disease. In this number the diagnosis was positive; but it must be remembered that there were probably others, here classified in the fourth group as gastric neuroses, which might have proved to be organic disease of one form or other if we could have had them long enough under observation and had been able to follow their course.

GROUP IV. There still remain 375 cases, not belonging to any of the 3 preceding groups, that have been diagnosticated as

gastric neuroses; and it is to this very large group, constituting the great majority of patients whose complaint is of stomach trouble, that I wish to call attention at this time.

MEANING. By the gastric neuroses are meant the cases of purely functional disorder of the stomach, without discoverable organic change. The neurosis may be secondary to organic disease elsewhere in the body, but in this review such secondary neuroses have been consigned to another group. Among the 375 cases of primary gastric neurosis here collected no organic disease could be found, either in the stomach or in any other organ. Popularly these cases are known as "nervous dyspepsia," and this designation will here be considered as synonymous with gastric neurosis. Theoretically they vary in name according to the particular function of the stomach that is found to be most disturbed, whether this be secretion, motility, or sensation. But, practically, disturbances of all the functions are found so variously combined that it is frequently difficult to decide which predominates in any given case; and from my experience with the material here reviewed, my own conviction is that too great refinement in diagnosis among these gastric neuroses is not profitable, even if it be desirable.

As regards secretion we have learned repeatedly, in dealing with these cases, that very great and persistent complaint of distress during digestion may be associated with a secretion practically normal after a test meal; while at another time, with no complaint at all of digestive disturbance, analysis may show a secretion abnormally high or low in acidity. The character of the secretion, therefore, cannot be the only factor concerned in producing symptoms.

As regards motility, there seems good reason to believe that impairment of the stomach's power to mix its contents thoroughly and to expel them promptly into the bowel may play a very important part in the production of distress during stomach digestion. But, after all, we have no reliable method of proving impaired motility, except the discovery of abnormal food particles in the test meal removed, indicating retention; and this, in my experience, if repeatedly found means almost invariably organic disease—either the changes in the stomach walls that come from chronic gastritis or cancer, or the obstruction at the pylorus that follows as a sequence of ulcer, pyloric cancer, or perigastric adhesions. For the existence of minor grades of impaired motility, such as might come from faulty innervation, we have no absolutely certain test; nor have we any way of proving, on the other hand, that moderate disturbances of motility invariably produce symptoms.

Disturbances of sensation, especially hyperesthesia, seems after all to be the most certain factor in the production of dyspeptic symptoms; for by this patients become to a greater or less degree conscious of the digestive process and restless and uneasy and distressed so long as it goes on. In no other way does it seem possible

In the sifting of these 574 cases of self-labeled "stomach trouble" we have been able to distinguish four groups: (1) Cases in which the symptoms were really due to disease of other than the digestive organs; (2) cases in which the symptoms were due to disease of the digestive organs, but to organs other than the stomach; (3) cases in which the symptoms were actually due to organic disease of the stomach; and (4) cases that could only be classified as gastric neuroses.

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to explain many cases of gastric neurosis that persist after secretory and motor abnormalities have been excluded so far as our methods of examination permit, and even after the diet has been carefully directed so as to prevent undue irritation. Such exaltations in the sensitiveness of the gastric mucous membrane have seemed to me to be the predominating factor in the production of symptoms in a great majority of the gastric neuroses, no matter whether the secretion was found normal, decreased, or increased, or whether the motor power seemed deficient or excessive.

To sum up the matter: By the gastric neuroses, or nervous dyspepsia, we mean those cases of stomach trouble in which there is constant complaint of varying kinds of discomfort during the digestive process, but in which careful examination shows no evidence of organic disease in the stomach itself. Probably no one function of the stomach is ever exclusively at fault, but the one most concerned in producing symptoms seems to be that of sensation.

ETIOLOGY. With this understanding as to the nature of the trouble, we are now in position to ask about the factors that produce it. In most cases neurasthenia underlies the gastric neurosis, and the causes of the former thus become the causes of the latter. But not all neurasthenics have stomach trouble; very frequently it is the heart, the genital organs, the eye, or some other organ that furnishes the major complaint. There must be some special influences that determine the stomach neurosis in preference to another, but the explana- of these influences is not altogether clear. However, the following factors have seemed especially to affect the incidence of nervous dyspepsia in the patients with whom we have had to deal: (1) Age, (2) sex, (3) nationality, (4) character of the food, and (5) conditions under which food is taken.

1. *Age.* Our patients have ranged as follows: Under twenty years, 14; between twenty and thirty, 86; between thirty and forty, 146; between forty and fifty, 64; between fifty and sixty, 46; between sixty and seventy, 19. Thus, while these figures show that the gastric neuroses occur at all times of life, they also show that the most frequent occurrence is in the decade between thirty and forty, and that a much larger number are found before than after forty—246 on one side as compared with 126 on the other side of this line. The gastric neuroses are certainly more frequent in early life, when ambitions are more eager, appetites more keen, emotions less under control, and excesses of all kinds more likely to occur.

2. *Sex.* Among the 375 cases 235 were males and 140 females, which makes it appear that nervous dyspepsia is more common among men. It must be remembered, however, that in any public clinic more men than women attend, which undoubtedly has some influence upon the preponderance of males among these cases. Nevertheless the fact here shown by figures corresponds with my own experience in private as well as in dispensary practice—that

gastric neuroses are more common among men, while other forms of neuroses—particularly cardiac and genital—are more common among women.

3. *Nationality.* I have had occasion previously to call attention to the cosmopolitan character of the population of San Francisco, as shown by the different countries represented in our clinic. Naturally the United States furnished the largest delegation to our aggregation of nervous dyspeptics, with 112 representatives; Italy came next with 76, Ireland third with 43, Germany fourth with 30, and Sweden fifth with 14; while Russia and England each supplied 11 cases. Besides these larger groups we had smaller ones from each of the following countries: Switzerland, Finland, Denmark, Norway, Portugal, Canada, Poland, Austria, France, Mexico, Central America, China, Japan, Scotland, Spain, Dalmatia, Wales, Belgium, Syria, New Zealand, Shetland Islands, and Azore Islands. There are two significant facts brought out by this examination of the nationality of our cases: first, that no race of people is exempt from stomach trouble; second, that among the foreign born the excitable Italians furnished so large a proportion of our material.

4. *Character of the Food.* Much has been learned in the last few years about the influence different foods exert upon the stomach's functions; and from the facts thus ascertained we are able to see more clearly how the character of the food may influence the development of the gastric neuroses. The first information of value upon this subject was furnished by Pawlow in his book, *The Work of the Digestive Glands;* and more recently the similar work of Bickel has still further opened our eyes. In questioning our patients about their habits regarding food, the following points have seemed to have an especial bearing upon the causation of their stomach trouble:

(*a*) *The Quality of the Food.* It has been shown by Pawlow in dogs and by Bickel in human beings that certain kinds of food-stuffs call forth more gastric juice than others. Bickel states very definitely, for instance, from actual observation, that the following substances elicit an abundant secretion: among drinks, all alcoholic and carbonated fluids, animal broths, and meat extracts in solution; all the spices, including mustard, pepper, salt, cloves, etc.; among solid foods, red meats when cooked rare, bread and all foods resembling bread in composition, that is, in a combination of albumin and starch. On the other hand, a slight secretion only is elicited by fats and cream; by well-done meats and coarse vegetable foods like boiled potatoes, cabbage, spinach, turnips, and carrots; and by sugars and sweets. Assuming now an underlying neurasthenia, it is easy to see that prolonged indulgence in the first group of food-stuffs may gradually induce an habitual hypersecretion during digestion, with all the subjective symptoms of hyperchlorhydria; or that a similar persistent use of the kind of foods described in the second

group may lead to an habitual deficiency of secretion, with the symptoms of subacidity.

(*b*) *The Preparation of the Food.* It has also been shown by the work of Pawlow and of Bickel that well-cooked food, presented in an appetizing way, has much to do with exciting the secretion of gastric juice; and that the looks of the food and its odor start the secretion of the gastric glands at once, even before the food enters the mouth, provided the looks are attractive and the odor is the agreeable one brought out by proper cooking; while, on the other hand, no such secretion occurs in advance unless the appetite is so aroused. Again, it is easy to see that the food of the poor man's table, selected for cheapness, poorly cooked, served with no thought of its appearance, may lead the stomach into the bad habit of inadequate secretion and the patient ultimately into a clinic for stomach trouble.

(*c*) *The Mastication of the Food.* By Pawlow's experiments also it was shown that by the act of mastication the gastric glands were reflexly stimulated to secretion, and that if chewing was sufficiently prolonged the food mass when finally swallowed found an adequate amount of gastric juice waiting to receive it; but that if chewing was hasty and food was swallowed rapidly a much smaller amount of secretion was in readiness when the mass reached the stomach. Furthermore, if the food is not finely divided by the teeth, it must be more vigorously triturated by the stomach walls in order to convert it into a soft, pultaceous mass; this throws extra work upon the stomach, which may result in faulty motility in an individual whose supply of energy is in every way deficient, as it is in neurasthenia. Thus in two different ways hasty eating and improper mastication may impair the stomach's function and ultimately bring about a gastric neurosis; and hasty eating is one of the commonest vices of the day.

5. *Conditions Under which Food is Taken.* The fact has long been recognized from experience that the circumstances surrounding the taking of food have much to do with its digestibility; and that emotional disturbance during a meal, such as vexation or anger, may make the best food disagree. Recently this fact has received a scientific explanation, through one of the experiments of Bickel. He found that if a dog, just before its feeding, was angered by a cat, the stomach secreted only about 9 c.c. of gastric juice, whereas ordinarily it secreted about 67 c.c. Furthermore, if the cat was brought into the room at a time when gastric secretion was at its height, the latter suddenly stopped, dropping from a rate of 28 c.c. every five minutes to 8 c.c. in the same length of time. This explains the common observation that food taken under disagreeable conditions so frequently gives rise to distress. No doubt many times the gastric neuroses owe their origin to such a cause. Meals eaten habitually in the midst of wrangling and dispute, or while the mind is occupied

with recalling disagreeable incidents of the day's work, or under the influence of worry about the cares of the household or the family, can scarcely fail to derange the stomach's functions and thus bring about a chronic state of nervous dyspepsia.

Clinical History. The symptoms of nervous dyspepsia are manifold and include every complaint about digestion that has ever entered into the mind of man. The story most often heard has been one of distress after food, described as a discomfort, a burning, a sense of weight, a load, a heaviness; this distress varying in severity in different cases until it becomes in some actual pain, as unbearable as that produced by true organic disease. Next in frequency comes the cry about "gas" on the stomach, flatulence, belching, a sense of distention, rumblings, and internal explosions. Third in order of frequency comes a sense of nausea while digestion is in progress, frequently persisting until the stomach is emptied by vomiting, which terminates the discomfort until food is taken again. All sorts of variations of these cardinal symptoms have been met with in the cases reviewed. No two patients tell their story just alike, and the most diverse combinations of minor and major items occur. There is, therefore, no characteristic clinical history that makes us certain we are dealing with a gastric neurosis. Every history of "stomach trouble" may mean serious organic disease, and no diagnosis ought ever to be made on subjective evidence alone. Two points in the story, however, always make us suspicious that gastric neurosis is the real condition present: (1) The long duration of dyspepsia, in many of our cases amounting to months or even years; and (2) in spite of this long duration, no particular disturbance of nutrition or of strength. As regards the various forms of gastric neurosis, only one, hyperchlorhydria, seems to have a fairly constant history. Here the patient's story is of a burning pain, with belchings and sour eructations, coming on two or three hours after food is taken, persisting until the next meal, which relieves the discomfort entirely, or until vomiting occurs at the height of the distress, emptying the stomach of its very acrid, irritating contents. These cases can usually be recognized by the account the patient gives of them, but not always; and a diagnosis should never be made of the form of neurosis, any more than of a neurosis itself, on subjective evidence alone. Except for hyperchlorhydria, there is no other neurosis that gives a history even fairly constant.

Stomach Analysis. From what has already been said, it will be understood that the conception of a primary gastric neurosis excludes all organic disease; and that physical examination of other parts of the body shows no lesion to account for the gastric symptoms. There still remains, however, the investigation of the stomach's functions, and this we accomplish by the analysis of a test meal. In our series of cases the meal employed has been the Ewald test breakfast of toast and water, removed after one hour. We have taken phenol-

phthalein as the indicator and titrated with the decinormal sodium hydrate solution to determine the total acidity; and, following the lead of most authorities, have accepted 40 and 60 as the lower and upper limits of a normal total acidity. Out of the 375 cases diagnosticated as gastric neuroses, 284 had such analyses made, in the great majority a number of different times. Of these cases 136 showed a subacidity, 133 a hyperacidity, while in 15 the degree of acidity fell within normal limits, even though there was constant complaint of "stomach trouble."

There remain 91 cases in which no stomach analysis was made, but in which the history of long-continued dyspepsia, the absence of any evidence of organic disease, and the well-preserved nutrition made the diagnosis of gastric neurosis the only one possible. These cases in which no analysis was made divide themselves into three groups: (1) The patients who positively refused to take a test meal, a rather large group among the ignorant class with whom we have to deal in a dispensary clinic; (2) those who took the test meal and were willing to have it removed, but in whom we found it impossible to pass the tube because of the struggle that the attempt caused; and (3) those who took the test meal and had the tube passed at the end of one hour, but without our obtaining any stomach contents—cases described as hypertonia, a neurosis of motility, by which the stomach is emptied prematurely.

Diagnosis. Before making a diagnosis of gastric neurosis in any patient complaining of stomach trouble, a great many precautions must be taken. Subjective symptoms alone mean nothing. A thorough physical examination of the heart, lungs, blood, and urine comes first, to eliminate what has been classified as Group I among the cases of dyspepsia. Then the history and physical examination must be directed to the liver and gall-bladder, the intestines, and rectum, before we can exclude these and decide that disorder of the stomach itself is really the cause of the so-called "stomach trouble." Finally, we must determine whether organic disease of this organ is present or whether the symptoms are due solely to functional derangement; and this is the hardest task of all.

Of course, if the symptoms have lasted for months or for years with variable intensity; if the patient is still well-nourished and strong in spite of persistent dyspepsia; if besides the stomach symptoms there are other evidences of a neurasthenic condition but no evidence of the presence of a tumor in the stomach, or of dilatation or bleeding, it then becomes easy to conclude that the case is one of gastric neurosis, even without the aid of stomach analysis after a test meal. But if, on the other hand, there has been loss of weight and strength coincident with the "stomach trouble;" or if the symptoms have persisted in spite of intelligent treatment directed to a supposed gastric neurosis; if still there is no tumor demonstrable, no hemorrhage, either oustpoken or occult, and no evidence of food retention;

then, in spite of every effort, we are often left in doubt as to whether or not organic disease exists, even though repeated stomach analyses have been made. What we most desire is an early recognition of organic disease, before it has advanced to the stage of gross changes, such as a palpable tumor or an open vessel with free discharge of blood. In this early stage there is a chance for cure, but there is also a chance for serious error, because we cannot attain certainty in diagnosis and must be satisfied largely with probability, even after every ordinary method of investigation has been employed. Not a few of the cases that seem to be simply gastric neurosis when first observed gradually prove themselves something more serious as the months go by; and in the group here recorded as gastric neuroses I have no doubt there were some incipient cases of ulcer and of cancer that might have been ultimately recognized if we had had our cases long enough under observation. My conclusion about the gastric neuroses, therefore, is that they constitute, undoubtedly, the largest group of stomach disorders with which we have to deal; but that this diagnosis, no matter how honestly made, often masks a primary organic disease of whose existence time will gradually unfold the conclusive proof.

It seems to me very important, therefore, to emphasize the necessity for constant vigilance, repeated investigation of all kinds, and close attention to the results of therapy in these cases of gastric neurosis; with a keen realization that the diagnosis first made may later have to be revised; that the case of persistent hyperacidity ought to be given routine medical treatment for gastric ulcer long before hematemesis and attacks of gastralgia make the diagnosis certain; and that the case of persistent subacidity, with or without the evidence of chronic gastritis, ought to be submitted to the surgeon for diagnostic incision without waiting too long for a palpable tumor or for coffee-ground vomitus to convince us that cancer is the real disease present.

Prognosis. Gastric neuroses do not kill, but they render life exceedingly unpleasant—for the physician oftentimes as well as for the patient. It is best not to be too positive about promising rapid cure just because we do not find organic disease. My own experience is that these cases are usually protracted and obstinate, yielding for a time to treatment, only to recur; though it is possible to cure them entirely with persistent repetition of our instructions and with intelligent coöperation on the patient's part in carrying them out. Two points are especially to be borne in mind when giving an opinion as to outcome: (1) The possibility, just mentioned under diagnosis, that what seems clearly at first to be a gastric neurosis may prove later to be ulcer or malignant disease; and (2) that in order to effect a cure we must depend more than anything else upon a change in the patient's habits of living and upon his compliance with restrictions that are not always acceptable. For these reasons the prognosis

should always be guarded, so that physician and patient may equally avoid disappointment if progress is slow.

TREATMENT. Nervous dyspepsia constitutes the paradise of the fakir and the patent medicine man. It is the great frequency of "stomach trouble" that calls forth the immense crop of digestive tablets and elixirs, advertised to the public in street-cars, on billboards, in the newspapers, and on trees, cliffs, and hillsides. As a matter of fact, however, these much-vaunted remedies do no more than relieve symptoms temporarily, and do not always do that; for the cure lies not so much in drugs as in reformation of the habits of life. The rational treatment of the gastric neuroses looks less to the outward manifestations than to the conditions and surroundings that have called them forth, and the details that must receive consideration are the following:

1. *The Underlying Neurasthenia.* This in general calls for a return to "the simple life," with less stress and strain. Excesses of all kinds must be sought out and stopped, of whatever nature they may be—in study, in business, in society, in household duties, or in sexual affairs. Without such investigation and correction of our patient's occupations and surroundings, habits, and ambitions, we cannot hope to accomplish much; for people with stomach trouble need intelligent directions as to rational living far more than they need prescriptions. No doubt the systematic rest cure in a sanitarium, or travel, with the diversion and change of scene it gives, are valuable adjuncts to treatment; but for the majority they are simply out of the question because of limited means. On the other hand, it is always possible to insist upon regular hours for meals; regular hours for sleep; a daily bath; systematic outdoor exercise, even if it be no more than a walk to and from work or business; and the avoidance of introspection, self-examination, and self-pity. Such advice, however, is only too often utterly rejected by the ignorant, who have no use for any remedy that does not come out of a pill-box or a bottle.

2. *The Way Food is Taken.* It has previously been shown how much this has to do with the production of dyspepsia. People must be taught that food eaten rapidly always digests slowly and often with distress; and inadequate chewing of food is one of the most common causes of stomach trouble. Again, rest for a short time after meals, before mental or bodily activity is resumed, is often all that is needed to make digestion go on unawares. Excitement, worry, and annoyance while at table are a common source of trouble, and often their elimination suffices to overcome the long-standing digestive distress. All of these matters must be carefully explained to the patient, no matter how trivial they may seem; for upon such apparent trivialities success in treatment often hinges.

3. *Quality and Quantity of the Food.* Habitual overeating is a frequent source of dyspepsia, for continued overwork induces exhaus-

tion in the stomach as in the brain or any other organ. Hence, reduction in the amount of food taken is in some cases the most valuable therapeutic resource. Consciousness of this fact has recently led to the adoption of certain popular fads for the cure of dyspepsia, such as the "no breakfast" cure or the "no lunch" cure. They are not altogether fads, though the mistake made is in adopting them promiscuously without previous investigation of the true nature of the "stomach trouble."

Habitual overindulgence in certain kinds of food is also a matter for investigation and correction. Any of the food-stuffs may thus cause offence if repeatedly taken to excess. It may be the starches, the sugars, the fats, or the proteids; it may be coffee, tea, or alcohol; it may be acids or condiments. The particular kind of food that is being taken too freely can best be found by questioning the patient regarding his habits and his preferences; and such questioning should form a part of our routine examination as a preliminary to advice.

But our best guide as to the quantity and quality of the diet to be prescribed is furnished by the analysis of the test meal; for this tells us what particular function is at fault and how it is deranged. If the condition proves to be one of hyperacidity, the essential feature of which "consists in an abnormal irritability of the secretory apparatus of the stomach during its time of labor," then food should not be given too often and not of such kinds as especially stimulate secretion. Three meals a day are usually enough and a mixed diet has proved most useful. Fats, cream, and butter; well-done meats of all kinds; milk and cocoa; vegetables like boiled potatoes, cabbage, spinach, turnips, and carrots; sugars and sweets—these are the foods especially indicated; while spiced, salty, and sour articles of diet, coffee and alcoholic and carbonated drinks, ordinary bread-stuffs, and rare meats must be excluded.

If the condition is found to be one of subacidity, exactly the opposite course is indicated. The food should be taken in small quantities at short intervals, for there is no stimulation to secretion equal to the act of eating. Meats cooked rare; bread-stuffs, crackers, zwieback, and toast; condiments, spices, salt foods; alcohol in moderation and carbonated waters; animal broths and meat extracts—these are the foods that should be given; while fats, sweets, and coarse vegetables are contra-indicated and should be omitted. In subacidity especially the value of attractive preparation of food and of thorough mastication as stimulants to secretion must be impressed upon the patient.

If there is faulty motility, as found by food retention and delay in emptying the stomach, then the quantity at each meal must be small, especially the fluids. The food must be finely divided—meat in a minced or scraped condition, vegetables in the form of purees, and cereals in gruels. Crackers, crisp bread, zwieback, and toast must

be thoroughly ground by the teeth, and all coarse foods with much bulky residue—as beans, corn, spinach, etc.—must be avoided.

4. *Drugs.* The use of these is constantly necessary to combat disagreeable symptoms, but it must be understood that they are only adjuncts and not the main resource in the treatment of the gastric neuroses. The useful ones can best be considered under the head of each important type of neurosis:

Hyperacidity. In hyperacidity drugs help us (*a*) by checking gastric secretion and (*b*) by neutralizing excessive secretion. To check secretion our best drug is belladonna, given in doses of $\frac{1}{4}$ grain of the extract a half-hour before each meal, the efficacy of which has been proved both experimentally and clinically. To neutralize excessive acidity, bicarbonate of sodum is the popular remedy, and a useful one; but a formula learned originally from Stockton has been used in our clinic for a number of years past, with most satisfactory results; it consists of cerium oxalate, 2 drams; bismuth subnitrate, 4 drams; and the light carbonate of magnesium, 1 ounce; of which powder 1 teaspoonful is given one or two hours after meals, when the symptoms of excessive acidity appear.

Subacidity. In subacidity drugs come to our aid (*a*) by stimulating secretion and (*b*) by supplementing deficient secretion. To stimulate secretion the bitter tonics have proved most satisfactory; and of these we have employed with greatest frequency the tincture of nux vomica, in doses of 10 to 30 drops before each meal. To supplement deficient secretion we employ dilute hydrochloric acid in doses of 10 to 30 drops, well diluted, after each meal.

Faulty Motility. For this neurosis, strychnine has been found our most reliable drug, given before or after meals, in doses of $\frac{1}{40}$ to $\frac{1}{20}$ grain. As disturbances of motility are usually found combined with secretory disturbances, the state of the secretion must also be carefully considered before drugs are prescribed.

Hyperesthesia. In cases in which symptoms of dyspepsia persist in spite of normal analyses and negative findings as regards disturbed motility, we have had excellent results in our clinic from sodium bromide and valerian, given in the following formula: Sodium bromide, 20 to 30 grains; elixir of the valerianate of ammonium, 1 dram—such dose given in water after each meal, continued for several weeks or a month.

5. *Physical Treatment.* The various physical methods suggested for influencing secretion, such as intragastric galvanization or faradization, intragastric douches and sprays with various medicated solutions, or abdominal packs and hydrotherapeutic applications, have never seemed to me to yield satisfactory results. Even the value of gastric lavage is probably overestimated and, in my opinion, it should not be employed as a routine measure day after day. It has its value in the relief of symptoms, to remove hyperacid gastric

contents to stop distress, or to remove retained or fermenting material when motility is deficient; but it is doubtful whether it can influence the secretion of the stomach in any way. All of these measures do harm by keeping the patient's attention directed to the stomach and reminding him of its delinquencies; and in the neuroses this is a distinct hindrance to recovery.

THE DIAGNOSIS AND TREATMENT OF INFECTIONS OF THE BILIARY PASSAGES, WITH SPECIAL REFERENCE TO CHOLELITHIASIS AND CHOLECYSTITIS.

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The work of such men as Kehr and Riedel in Germany, Mayo, Robson and Moynihan in England, and Richardson, Mayo, and others in America, has of late years placed the surgery of the biliary passages, and especially of cholelithiasis, upon a firm footing. The actual work at the operating table has been the prime factor in elucidating the very obscure facts in connection with the etiology, pathology, and diagnosis of these conditions, assisted though it has been by many brilliant researches and careful postmortem pathology. As in appendicitis, so in gall-bladder disease, it remained for the surgeon to show how different is the process in life from the end result as shown at the necropsy.

I shall report herewith the results of my own work in a series of 217 cases of gall-bladder surgery, more especially in reference to cholelithiasis and cholecystitis. This includes 182 cases of calculous cholecystitis, and 35 of non-calculous cholecystitis.[1]

There is no doubt that cholelithiasis, cholecystitis, and all their results, near and remote, should be really classed as consequences of infection. The infection may not always be demonstrable in its results, the causative factor not always to be found when the damage has been done, yet in my opinion the inflammatory factor is the important one in all but the malignant diseases of the biliary tract.

While there is still some divergence of opinion concerning the exact method of the formation of gallstones, all authorities seem agreed that a bacterial invasion of the gall-bladder is a necessary factor. The effects of stasis of bile, peculiar chemical composition of the bile, and of the condition of the gall-bladder mucosa are not so well understood.

[1] These comprise the cases operated upon between January 1, 1903, and April, 1907.

Concerning the mode of infection there is much doubt, yet in most cases it is apparently by means of the portal circulation. The character of the infection varies. Much stress has of late been laid upon the importance of enteric fever as a causative factor in cholelithiasis, and this has been fully borne out by my experience. Of 182 patients with calculous cholecystitis, that is, cholelithiasis, 51 (28.0 per cent.) had at some time or other had enteric fever. The interval between the occurrence of the enteric fever and the appearance of symptoms of cholelithiasis varied from a few weeks to many years. In several cases in which there had been enteric fever previously we have been able to recover Bacillus typhosus from the gall-bladder or ducts at the time of operation; in one case as long as forty-one years after the occurrence of the acute infection. Yet more interesting is the fact that Bacillus typhosus was recovered from the gall-bladder in 4 cases in which absolutely no history could be elicited of any acute invasion of the intestinal tract resembling enteric fever.[2] Why the biliary tract should be the seat of choice, and why the bacteria should be able to remain there and continually pass down through the intestines without causing further trouble I shall not attempt to explain. Numerous other bacteria have been found by us. As would be expected, Bacillus coli predominates. Thus, in the 182 cases of cholelithiasis, cultures were made in 94,[3] of which there were: Sterile 46; Bacillus coli in 25; Bacillus typhosus in 13; Staphylococcus pyogenes in 5; unidentified 3; Bacillus coli and staphylococcus in 2. Bacillus subtilis was found within calculi in 1 other case.

In practically half of these cases the cultures were sterile. This is not so remarkable when we consider the fact, already mentioned, that the condition most favorable to the formation of gallstones is one of mild infection by an attenuated culture of an organism whose virulence has been decreased to a minimum. Thus it is easy for the gallstones to be formed and for the bacteria to die gradually and be absent at the time of operation.

In the 35 cases of non-calculous cholecystitis, acute and chronic, cultures were made in 18; 6 (33.3 per cent.) showed Bacillus coli communis; 12 were sterile.

The nature or degree of severity of the infection cannot furnish us with any indication of the organism present, at least so far as I have been able to judge. The various bacteria have been found to give rise to practically the same processes, pathologically and clinically, and each or any one of those mentioned may be the causative factor in any form of infection. Nor can we be even certain that bacteria may be found under any given set of conditions. Thus

[2] See: Kelly, A. O. J., Infections of the Biliary Tract, Amer. Jour. Med. Sci., 1906, cxxxii, 446. 744.

[3] These include the 70 cases previously reported by Dr. Kelly, loc. cit.

for instance, in 20 cases of empyema of the gall-bladder associated with stones, 15 were investigated bacteriologically with the following results: Sterile 6; Bacillus coli in 3; Bacillus typhosus in 5; Staphylococcus pyogenes in 1; undentified 1. In 1 case of non-calculous empyema that was examined bacterially Bacillus coli was found. The main facts concerning the bacteriology of these cases are: (1) The difficulty of demonstrating bacteria by ordinary culture methods, even in cases of empyema. (2) The absence of any variation due to the nature of the organisms involved. (3) The frequency of the occurrence of Bacillus typhosus even in cases without a history of pre-existing enteric fever.

Why infection in one person should cause stone and in another cause cholecystitis of a mild grade and marked pericholecystitis, with or without adhesions, I am unable to say.

Besides infection as a causative factor in the production of gallstones, we have been able to confirm the statistics of others regarding sex and age. Thus, of 182 cases of cholelithiasis, 139 (76.4 per cent.) were females, and 43 (23.6 per cent) were males. We have noted the frequency of occurrence of gallstones in the Hebrew race.

There has been nothing to indicate the association of a family history of gastric or biliary cirrhosis in cases of gallstones, or any sign of such a thing as cholelithic diathesis, if that term may be permitted. We have been unable clinically to demonstrate the dependence of gallstones, directly or indirectly, upon errors in diet, faulty metabolism, or digestive disorders.

Pathology. The pathology of cholelithiasis is a subject of great extent, involving as it does not only an understanding of the nature of the immedate results of the formation of stones, but also of those more remote. I shall not enter upon a discussion of stone considered chemically, as this subject has already been well covered by others and has no practical bearing upon the subject at hand.

The pathological processes associated with gallstones may be subdivided into three great classes: (1) Those concerning the stones themselves and their mechanical action. (2) Those concerning the biliary passages and the liver. (3) Those entirely beyond the biliary tract.

The Stones Themselves. In considering the mechanical effects of gallstones we must take into consideration: (*a*) Their size, (*b*) their location, and (*c*) their number. The gallstones I have found at operation have been from 3 cm. in diameter, the largest, to fine sand, and in number from one to hundreds. They have been found in the gall-bladder and in the ducts in almost every combination. The appended table shows where the stones were located and also how located in special classes of cases:

LOCATION OF CALCULI.

		Simple cholelithiasis.	Cholelithiasis and cholecystitis.	Simple hydrops.	Cholelithiasis and abscess.	Cholelithiasis and carcinoma.
Gall-bladder alone	107	62	34	3	5	3
Gall-bladder and choledochus	24	17	6	0	1	0
Gall-bladder and cysticus	26	11	9	6	0	0
Gall-bladder, choledochus, cysticus	2	1	0	1	0	0
Gall-bladder, choledochus, hepaticus	2	1	0	1	0	0
Choledochus only	12	9	3	0	0	0
Cysticus only	6	2	2	2	0	0
Gall-bladder, cysticus, choledochus, and hepaticus	1	1	0	0	0	0
Choledochus and hepaticus	2	2	0	0	0	0
Total gallstone cases	182	106	54	13	6	3

The most important deductions from facts in this table are as follows: (1) In cases of hydrops there was either a stone in the gall-bladder only, or in the cystic duct, at times with associated stones in the gall-bladder and choledochus. (2) In the vast majority of cases the calculi, even when causing symptoms, are found in the gall-bladder alone. (3) The rarity of finding stones in the hepatic duct, which in connection with other facts mentioned shows that, while calculi may be formed within the hepatic ducts, their point of origin is undoubtedly in the gall-bladder in most cases. In one case a calculus was found in the duct of Wirsung. This was in a case in which there were stones also in the gall-bladder, choledochus, and hepaticus, and which will be later referred to.

The mechanical action of the biliary calculi is exerted in several ways: (1) They act as foreign bodies in the gall-bladder. (2) They may obstruct the flow of bile by lying either in the gall-bladder or cystic duct and causing pressure upon the choledochus, or lying in the choledochus itself. (3) Their motion through the ducts gives rise to biliary colic. (4) By pressure upon the pancreatic duct they may obstruct the flow of pancreatic secretion and cause a pancreatitis. (5) They may cause pressure necrosis of the gall-bladder and ducts and ulcerate through either into the peritoneal cavity or an adjacent organ. (6) After passage into the intestines they may cause intestinal obstruction.

1. The action of the gallstones merely as foreign bodies is important only in the fact that in so far as they injure the gall-bladder mucosa they afford an entrance to harmful bacteria, which may cause a fresh cholecystitis.

2. The mechanical obstruction to the flow of bile is more important. When it takes place jaundice occurs. When the choledochus itself is blocked the jaundice is easy enough to understand. The jaundice in cases of stone in the gall-bladder alone or

in the cysticus may be caused in several ways: (*a*) By direct pressure upon the choledochus, as when the neck of the gall-bladder is pouched out or pressed on the common duct. (*b*) By an inflammation set up by the stone which spreads to the choledochus and causes its occlusion. The latter is by far the more common mode of action.

3. Motion of the stones causes biliary colic. This is open to dispute. While the presence of some degree of inflammation may be necessary for the occurrence of typical colic, it does not in itself seem a sufficient cause when the calculi are at rest. Colic in the gall-bladder and bile passages probably is caused as it is in other portions of the body, that is, by muscular action of the walls of a hollow viscus.

4. Pancreatitis associated with cholelithiasis is well known, and forms a grave and often intractable complication. I have noted it many times at the operating table, and it has been demonstrated several times postmortem in cases in this series. None of them showed acute pancreatitis. Chronic pancreatitis was present in 11.1 per cent. of the fatal cases.

5. Several of the cases presented perforated gall-bladders in which the lesion was caused by stone. I have seen 1 or 2 cases in which, with impacted gall-bladders, the stones were working themselves through the gall-bladder without very much apparent damage to its walls. In one case notably the stones could be picked off from the outside of the viscus without opening it and were held by but a few adhesions.

I have had no cases of gallstone ileus, but its existence and clinial features are so well known that it requires mention.

Among the pathological processes found in the gall-bladder and biliary passages, the following are the most important, all of which have been illustrated in the present series of cases:

1. Cholecystitis:—
   - (*a*) Acute.
     - Catarrhal.
     - Purulent—empyema.
     - Hemorrhagic.
     - Ulcerative.
     - Gangrenous.
     - Phlegmonous.
   - (*b*) Chronic.
     - Catarrhal.
     - Hydrops.
     - Obliterative.
2. Cholangitis.
   - Acute catarrhal.
   - Acute purulent.
   - Chronic catarrhal.

3. Hepatitis.
   Acute or purulent.
   Chronic or cirrhotic.
4. Pericholecystitis.
   Acute inflammatory.
   Acute purulent.
   Chronic adhesive.
5. Localized peritonitis with abscess.
6. Perforation of the gall-bladder.
7. General peritonitis.
8. Biliary fistula.
9. Carcinoma.
10. Pancreatitis.

Any or all of these complications mentioned may also supervene upon non-calculous cholecystitis. The divisions are important enough to be considered in detail.

Cholecystitis. Acute cholecystitis of one of the varieties mentioned is quite commonly found in cholelithiasis, especially in those cases coming to the surgeon. Indeed often it is only the setting in in of an acute inflammatory condition which induces the medical attendant to think of operation. Of the acute forms of cholecystitis, the catarrhal is perhaps the most common. Scarcely a case of cholelithiasis giving symptoms in any way marked fails to show some degree of inflammation of the gall-bladder. The mucosa is thickened, œdematous, and red; the bile thick, dark, and ropy. This condition is not grave, and with the removal of the exciting cause soon subsides.

Empyema of the gall-bladder is also quite common. In this series of 182 cases it occurred in 30, or 16.4 per cent. It was found in in cases both chronic and acute, showing itself of course as an acute manifestation in the course of chronic cholelithiasis. The bacteriology of gall-bladder empyema in cholelithiasis has also been referred to, and I would again call attention to the percentage of cases, 6 (37 per cent.) of 16 cultured, in which no bacteria were demonstrable. Empyema is an important and dangerous complication of gallstones, forming as it does the starting point for further purulent invasion, causing general sepsis, interfering with the technique of operation, and leading to peritonitis by extension and by rupture of the gall-bladder. It is fortunate indeed that the gall-bladder is capable of great distention by pus or bile. In 1 case of empyema in this series, operated upon by my assistant, Dr. Ross, the gall-bladder reached to the brim of the pelvis, and had been diagnosed as an inflamed ovarian cyst. It was about the size of an infant's head, with walls enormously thickened. The occurrence of empyema in a gall-bladder chronically contracted or pressed upon by adhesions is all the more dangerous because the pus must find new localities for extension, either into the bile passages or through the

gall-bladder wall. The character of the pus in empyema varies. At times it is but a flaky cloud in the bile or bile and mucus. At times it is thin and foul, at others thick and viscid. Its powers of infection is, as a rule, marked.

Hemorrhagic cholecystitis is illustrated in 2 cases of the series in which blood clots were found floating in the thick, tarry bile. One other case showed bile stained by blood pigments, but no blood. These conditions are rare and interesting and the exact mechanism of their causation is unknown.

Ulcerative cholecystitis occurred in 10 of the cases, 5.5 per cent. The amount of ulceration varied from a small necrotic area to almost one-half of the gall-bladder, the cause being apparently direct pressure by the gallstones. Perforation occured in several of these cases.

Gangrenous cholecystitis was found in 17 (9.4 per cent.) of the cases. The gangrene varied in extent and degree. In some cases it involved the whole viscus, in others but a part. In some only the mucosa was involved, in others the entire thickness of the organ. Gangrene of the gall-bladder is often difficult to deal with at operation, as the organ cannot be either resected or satisfactorily removed; it is friable, infection is spread, and hemorrhage difficult to deal with. The use of the term phlegmonous cholecystitis by some of the English authors seems a relic of antiquated medical nomenclature, and has been used to designate an acute purulent and gangrenous process. I have included such cases among the cases of gangrenous cholecystitis. In connection with acute cholecystitis I would mention one remarkable case in which the whole mucosa of a very much diseased gall-bladder was studded with fine deposits of biliary salts. This may be an illustration of the method of formation of biliary calculi.

Chronic cholecystitis is the accompaniment of practically all those cases of cholelithiasis in which the gall-bladder is not acutely inflamed. The catarrhal form is the more common, and here we find the thick, tarry bile so significant of this condition. It disappears with the removal of the exciting agent.

Hydrops of the gall-bladder is caused by some cause closing the exit of the gall-bladder itself, the gall-bladder containing some bile is then further distended by the mucoid secretion of its walls, the bile is gradually absorbed, and there remains a clear mucoid fluid. The walls of the gall-bladder are thinned, often transparent as parchment. This fluid seems to be an excellent culture medium for pyogenic bacteria, as several of the cases of empyema have been cases of hydrops with the superaddition of pus. Hydrops occurred in 13 of the 182 cases, or 7.1 per cent. They all occurred in females, and in each case there was a stone in the cysticus or gall-bladder, generally the neck. None of the cases of hydrops upon which I have operated have reached the enormous size of some cases reported by others.

Chronic obliterative cholecystitis is, as a rule, the result of numerous attacks of acute inflammation. It is in many cases associated with chronic or adhesive pericholecystitis. The shrinking of the gall-bladder in many cases is due to the presence of stone in the choledochus; yet of 43 cases with stone in the choledochus, in 25 of which there is specific mention of the size of the gall-bladder, it was enlarged in 10, contracted in 15, a state of affairs somewhat at variance with the results of other observers. Of the 182 cases, in 30 (16.5 per cent.) the gall-bladder was contracted. The degree of contraction of the gall-bladder has varied greatly; in some cases it was slight, in others its lumen was practically entirely obliterated. In 3 cases an hour-glass gall-bladder was found. In 1 case this condition was so marked that the two parts were connected only by a fibrinous band, the stone being in the proximal portion.

Cholangitis results from the direct extension of the inflammatory process from the gall-bladder; chronic and acute cholangitis are commonly found associated with similar conditions of the gall-bladder. Acute cholangitis is responsible for many attacks of jaundice, the most, in fact, in connection with cholecystitis. Jaundice by blockage by stone is rare, jaundice in cholelithiasis due to cholangitis is common.

Acute purulent cholangitis is fortunately rare, and when it exists is practically always fatal. Two cases, not included in the above list, have been seen by me in which this was the condition operated for. They were both associated with liver abscess and stone, and both terminated fatally. In 2 cases of the 158 an acute cholangitis, with liver abscess following operation, was the direct cause of death.

Hepatitis of the acute purulent variety is the direct consequence of a similar cholangitis. When liver abscess follows cholecytitis or cholangitis the abscesses are practically always multiple and the condition fatal.

Chronic hepatitis or *cirrhosis* is found in connection with many cases of cholelithiasis. In 46, or 25.3 per cent., the liver was enlarged; in but 3 cases decreased in size. This cirrhosis of the liver is, as a rule, the direct result of a catarrhal cholangitis and the damning back of bile. I have seen nothing to suggest a reverse state of affairs, that is that there is anything in biliary cirrhosis favoring the formation of gallstones.

Pericholecystitis. The acute forms of pericholecystitis are two. One form is that in which by extension the inflammation spreads to the peritoneum, and fibrous adhesions, œdema, swelling, etc., result. This is very common, as evidenced by its result, that is, chronic adhesive pericholecystitis. It is of course in its more marked forms generally associated with purulent or gangrenous cholecystitis. Its danger lies in its extension to the general peritoneum and its after results.

Acute purulent pericholecystitis, or localized abscess, and perforation of the gall-bladder are so closely associated that they must be considered together. Of 5 cases of localized abscess, 2 showed perforation of the gall-bladder, the total number of perforations in the series. The abscesses were subhepatic and about the gall-bladder, and several showed distinct pocketings or abscesses.

Chronic adhesive pericholecystitis, the after-result of a subacute pericholecystitis, is very common; 107 of the 182 cases, or 58.7 per cent., showed adhesions. Their extent, character, and location are subject to wide variations. In some cases there are but a few, to the duodenum, stomach, liver, omentum, or colon. In other cases several or all of these structures are bound together. The importance of adhesions of the upper abdomen has not been as fully appreciated as is warranted by the symptoms to which they undoubtedly give rise. Indeed, in many cases the symptoms and gravity of gall-bladder lesions are due not to them *per se* but to the accompanying adhesions. It is easy to understand how by traction upon the pylorus or duodenum, symptoms of obstruction of the pylorus can be and are simulated, and this is doubtless the explanation of many of the cases in which vomiting is such a persistent symptom and grave complication. Indeed, in one of my cases a slight deformity of the stomach at its pyloric end was so accentuated by adhesions that after operation persistent, uncontrollable, and finally fatal vomiting took place. Traction upon the colon gives rise to impediments to the flow of detritus and food, and hence causes partial obstruction, constipation, and tympany. In several cases in this series the ducts were so involved in adhesions that it was almost impossibe to find them, and the choledochus was thus occluded also. Naturally the presence of adhesions complicates operative procedures enormously. I shall touch upon this phase of the question in discussing treatment and the indications for operation.

General peritonitis by passage of microörganisms through the gall-bladder and existing at operation caused one of the deaths. Its occurrence is due only to unnecessary and improper delay in operation, especially in cases not seen until the gall-bladder has perforated.

Biliary fistula to internal organs results when a penetrating stone or inflammatory process is so localized and confined by adhesions that it enters not the general peritoneum but a neighboring viscus. There were in the 158 cases 2 cases of fistula—1 cholecystogastric and 1 cholecystoduodenal. In each case the fistula was such that the viscus could be closed by Lembert sutures and the gall-bladder appropriately treated. There were no external fistulæ except postoperatively. A spontaneous external fistula in these days of aseptic surgery shows almost unconceivable neglect of a gallstone case.

Carcinoma of the Gall-bladder. The series includes 2 cases of carcinoma of the gall-bladder associated with cholelithiasis. I have

had several previously. While the importance of carcinoma of the gall-bladder as a sequel of cholelithiasis has been pointed out by many authors, my own experience shows that it is rare, and not as Riedel asserts, the most-to-be-dreaded result of gallstones and occurring in 10 per cent. of cases. Far more important are adhesions and acute inflammations with their years of suffering or rapid death—as the case may be.

Pancreatitis is found in almost 10 per cent. of cholelithitic cases. My statistics on this point are not definite enough to give exact figures, but such is my experience. It can rarely be diagnosed definitely except at operation. I have not been able to ascertain its influence on the jaundice caused by the gallstones, nor have I been able to confirm the statements of some authors that the existence of pancreatitis leads to more severe hemorrhage than is the case in cases of gallstones not so associated.

SYMPTOMATOLOGY OF GALLSTONES. Gallstones give a variety of symptoms in endless combination. It has been stated that they do not in most cases cause symptoms. This is erroneous, I believe. More properly stated, the facts are that gallstones usually do not cause the symptoms commonly recognized as the classical ones in this condition, but by others which until recently have been misunderstood as to their diagnostic significance and minimized as to their importance.

The symptoms of gallstone disease are pain, jaundice, fever, tumor, nausea, vomiting, and, last but not least, that group of symptoms occurring in cases of cholelithiasis often long before the recognized signs and vaguely classified as stomach and liver trouble, biliousness, and indigestion. The classical symptoms are so well known, and their typical course so easily recognized, that diagnosis in their presence is not dificult. The symptoms singly considered are:

Pain is the most constant symptom of cholelithiasis. It was absent in but 3 of the 182 cases, or 1.6 per cent., that is, absent in any form whatever. But while present, as this shows, the pain varies greatly in different cases. The typical "biliary colic" of the text books is certainly not found in most cases, though it is frequent. There has been of late some disposition to minimize pain as a constant symptom. My experience has been that sharp pain in the epigastrium or gall-bladder region, referred in many cases to the shoulder, back, or chest, is the one cardinal sign of gall-bladder disease in its chronic form. 164 cases (90.1 per cent.) of this series had pain variously described as spasmodic, sharp, sudden, or cramplike in the regions described. I take this pain to be a true colic caused by muscular contractions of a gall-bladder or ducts upon contents either solid or fluid. In many cases a very careful history was required to elicit the history of this pain, as it occurred often long before the true nature of the disease was suspected. 16, or

8.8 per cent., of the cases had dull pain only in the epigastrium or gall-bladder region, which was variously described as dull, burning, gnawing, or a sensation of heaviness.

Tenderness as a variety of pain I have not found with that constancy referred to by some authors, notably Moynihan. Many of my cases have certainly shown no tenderness whatever in the gall-bladder area. Tenderness becomes, however, a marked symptom when cholecystitis, cholangitis, and localized peritoneal irritation are present.

When cholecystitis occurs, the tenderness is found to be closely confined to the gall-bladder area itself and severe or slight according to the degree of acuteness of the inflammatory condition. As soon as a local peritonitis occurs or a local peritoneal irritation sets in the tenderness at once becomes exquisite and its extent then becomes that of the whole right upper quadrant of the abdomen. The associated muscular rigidity also becomes a much more marked feature. This rigidity is often such as to preclude accurate examination of the patient locally. Tenderness over the liver itself, when slight, suggests merely a congestion of that organ; when marked and associated with other symptoms it suggests a purulent invasion of the bile passages or localized or multiple hepatic abscess.

Jaundice. This symptom of late has been discredited by many authors. Murphy, of Chicago, for instance, states that he has found it in but 10 per cent. of his cases. To my mind such statements are often based upon imperfect histories. My experience has shown me that about three-fourths of the cases at some time or other have jaundice, or, accurately, of the 182 cases, 69.9 per cent. had jaundice. In fact, 90, or 49.4 per cent., had jaundice at the time of operation. The jaundice, it is true, is not always marked, being confined in many cases to icterus so slight as to be seen only in the sclera. Nevertheless it is true jaundice, and to be distinguished with care clinically from that sallowness of the skin so commonly associated with many biliary disorders and faulty metabolism of various kinds. The jaundice in cases of cholelithiasis varies from time to time, and at many times clears up entirely; yet next to pain it is certainly the most reliable cardinal symptom.

Jaundice, as a rule, follows the colic or pain; in some rare instances it is the first symptom. In the history of many cases of cholelithiasis jaundice is found to be present at one attack and not at another, or marked in one and not in another. Its degree does not bear any direct ratio to the severity or the nature of the pain. The mechanism of its causation has already been discussed.

Accompanying jaundice there are three clinical manifestations essentially identical, that is, biliuria, absence of bile from the stools, and itching of the skin. Biliuria is easily explained, of course; it is not always present, and is marked only in the graver and more persistent forms of jaundice. Absence of bile from the stools is most commonly

associated with stone in the common duct, yet not by any means exclusively so; thus we note that in 13 cases of hydrops clay colored stools were noted in 2. Itching of the skin may either accompany the icterus or precede it. It is probably due to the deposit in the layers of the skin of foreign products normally excreted or secreted in the bile.

Nausea and *vomiting* often follow the acute attack of pain, at times are simultaneous and rarely precede the pain. The pain is often relieved by their occurrence. The causation of these symptoms is doubtless reflex and their occurrence is not one of the more marked features of cholelithiasis, though it is very common. Fever is another symptom of marked yet not paramount importance. Its presence helps us in a diagnosis; its absence, however, is not significant. The fever in non-infectious gallstone cases, when it is not essentially septic in origin, may precede, accompany, or follow the onset of biliary colic, or be entirely independent of it. The temperature rises rapidly, remains stationary a few hours, and rapidly falls, the interval between these elevations being entirely afebrile. Certain authors, notably Moynihan, have professed to find in this temperature a pathognomonic curve or angle. With this I cannot absolutely agree. I have found such temperature angles simulating or simulated by fever in a variety of infections and find it in nothing absolutely peculiar to gallstone disease. The fever is often accompanied by a rigor, slight or severe as the case may be. Often the rise in temperature and the rigor are represented only by a slight chilly sensation creeping over the patient.

The presence of fever with chills has been described by many observers as being peculiarly frequent in cases of stone in the common duct, yet while this has been my experience, I have also noted its presence in many other cases of cholelithiasis, so that it is not an absolutely sure point in the diagnosis of the various forms of cholelithiasis.

Tumor or the presence of an appreciable mass in the gall-bladder region is a valuable sign, more especially in those cases of cholelithiasis in which there exist hydrops, empyema with distention, or many pericholecystic adhesions. In cases of an acutely inflammatory nature the definite palpation of a mass is often made impossible by the muscular rigidity and diffuse tenderness accompanying the condition. Thus in simple hydrops, of 13 cases, in 6 cases the gall-bladder was definitely palpable, although in several others a sense of resistance in the gall-bladder region was noted. In several instances in this series of cases the gall-bladder, filled with stones, was palpable, the stones being distinctly noted. The diagnosis of the presence of calculi in this manner is, however, very rare.

The tumor formed by an enlarged gall-bladder may be confused with several things, notably movable kidney and tumors of the pylorus. A distended gall-bladder moves with respiration, and is

thus distinguished from a kidney. Its upper extremity is fixed when compared to the lower pole, which often has a pendulum motion from side to side. A movable kidney when replaced, with the patient in a recumbent position, remains in place. An enlarged gall-bladder remains there only so long as the pressure is directly continued. Tumors of the stomach must be differentiated by their position, the fact that they do not move with respiration unless closely adherent to other structures, and by their evident separation from the liver itself. The rarer forms of tumor simulating an enlarged gall-bladder in most cases cause symptoms showing them to be situated in other organs. It may be noted that the absence of a palpable gall-bladder does not of necessity signify that this organ is not enlarged, as when the gall-bladder lies deep beneath the liver, or is covered by a thick abdominal wall, it often cannot be made out even when of considerable size.

Indigestion. We now come to the group of symptoms referred to as those of "Indigestion" which are so prominent in gallstone disease. "Chronic indigestion," the bugbear of so many physicians and life-long companion of so many patients is at last, by the efforts of the surgeons, coming to be understood. Many cases are found to be due to organic disease of the stomach, notably chronic gastric ulcer. Many others, again, are found to be due to gallstones.

We have noted the existence of chronic indigestion in 44 of 182 cases, or 24.2 per cent. It manifests itself notably in epigastric distress and heaviness, often, and indeed in most cases, more or less independent of the ingestion of food. In some cases, however, it seems to depend directly upon it, and the patient often has sour eructations, slight nausea, and heartburn. These cases are exceedingly intractable, in fact not amenable to ordinary medical treatment at all.

It is probable that in the majority of cases in which these symptoms are associated with cholelithiasis they are due principally to the pericholecystic, perigastric, and pericolonic adhesions which come into existence as a result of the biliary lesion. This being the case, it is easy to see that in cases of this kind, in which so-called classical symptoms of cholelithiasis play a minor role, diagnosis is most difficult. This is the case because adhesions of the upper abdomen, no matter how caused, will give practically the same symptoms. They are also closely simulated in many cases of chronic gastric and duodenal conditions, so that they must be most carefully studied in order to be of value. The symptoms mentioned all occur in cholelithiasis independent of complications.

The various conditions often associated with gallstones have their own symptoms, which it is not my purpose here to do more than refer to. The symptoms mentioned are those we must make use of to diagnose gallstones early, before the onset of those complications which render gallstone disease so grave.

There is no especial difficulty of diagnosis in most cases of cholelithiasis in which there is an acute cholecystitis or pericholecystitis, or a purulent subhepatic collection. But then the proper time for a diagnosis has passed. The stones should have been removed long before the complications began, not left until they are almost beyond control. Before speaking of differential diagnosis it would be well to refer to non-calculous cholecystitis.

NON-CALCULOUS CHOLECYSTITIS.—The bacteriology and pathology of this condition have already been spoken of in connection with calculous cholecystitis. The pathology is practically identical in the two forms of cholecystitis, but although the pathological findings are similar, the method of their causation is different. Of 33 cases of non-calculous cholecystitis, 28 were chronic, 5 acute; of the latter, 3 were empyemas.

Cultures in 1 case of empyema showed Bacillus coli, in the other 2 no cultures were made. Of the remaining cases, 15 chronic ones and the other 2 acute ones had cultures made. Of these, 5, or 29.4 per cent., showed Bacillus coli, 12 were sterile. We may note here that Bacillus typhosus was not found in any instance, although 11 cases, or 31.4 per cent. of the total number, had had enteric fever. The pathological findings correspond to those in calculous cholecystitis.

The symptomatology in non-calculous cholecystitis very much resembles that of the more obscure forms of calculous disease and indeed often cannot be differentiated therefrom. In those cases in which I have operated for stone on what appeared to me to be an almost certain diagnosis and have been deceived, I have in most instances found a chronic cholecystitis, most often of the variety with pericholecystic adhesions.

Thus, of 30 cases of non-calculous cholecystitis, 12, or 34.3 per cent., were jaundiced at operation, while but 7, or 20 per cent., had no history of jaundice whatever.

Twenty-three, or 65.4 per cent., had had colicky pains, and in no instance had pain been absent altogether. In 9, or 25.4 per cent., the existence of a chronic indigestion had been noted. 5, or 14.3 per cent. had pancreatitis.

LABORATORY METHODS.—Those at our command in the diagnosis of calculous and non-calculous cholecystitis are: (1) The leukocyte count, (2) the *x*-rays, (3) the examination of the feces.

From the last two mentioned I have never been able to get results which would warrant me in regarding them as of any great value. The *x*-rays especially have been a source of continued disappointment in the diagnosis of gallstones.

The leukocyte count is certainly of some value, especially in purulent conditions of the biliary passages. I certainly cannot agree with Ewald and many others who have from time to time asserted that empyema of the gall-bladder does not give a hyperleukocytosis. In 28 cases of empyema in calculous cholecystitis

35 counts were made. The minimum was 3200, the maximum 32,600, the average 11,900. In 3 cases of non-calculous cholecystitis in which empyema existed, the average leukocyte count was 11,400. Thus we can see that while the leukocyte count in empyema varies greatly, it is considerably above the normal in most cases, and certainly is of value. It is also of use in differential diagnosis of the various forms of cholelithiasis. In simple cholelithiasis the leukocyte count in 104 cases rose over 10,000 in but 14 cases, and the maximum was 17,700; a considerable difference between the leukocyte count in empyema and uncomplicated cholelithiasis is at once noted.

Bearing in mind all the diagnostic features mentioned, it is evident that while the diagnosis of gallstones is in the more obscure cases a matter of great difficulty, in most cases the recognition is easy. This is so especially if the physician knows how to take a careful history and what symptoms to look for, and does not simply base his diagnosis upon the symptom-complex described in the ordinary text-books as the classical one in gallstone disease.

The difficult diagnoses are those in which the original disease is masked in its pathology and symptomatology by the existence of adhesions of the upper abdomen; then the distinction between gallstone and chronic gastric ulcer, or stone and non-calculous cholecystitis, often becomes a very fine one.

Among the diseases which occasionally cause us difficulty in the diagnosis of gall-bladder disease there are, besides those already mentioned, appendicitis, renal calculus, gastric crises in certain nervous affections, and many others. In all of these cases a careful study will generally clear the diagnosis without much difficulty.

The differential diagnosis between the different forms of cholelithiasis considered as to location of the stone or lesion it is not my purpose to present at this time. It is a subject as yet not upon a very firm basis. I would, however, impress the necessity of at once recognizing the presence of acute complications in those cases of cholelithiasis which for one reason or another do not come to the surgeon, but must be treated by the medical man.

TREATMENT. The medical treatment of cholelithiasis or of cholecystitis must of necessity be palliative, indirect, long continued, and uncertain; permanent relief to the patient can come only by surgical intervention. The medical treatment of calculous cholecystitis is limited to the relief of pain in the acute attacks and to efforts to keep the stones quiescent in the intervals. I know of no remedial measure for the solution or removal of biliary calculi. The surgical treatment of these diseases concerns us more directly. Surgery of the biliary passages is now firmly established. For a reason for its existence we have only to look at the long list of complications of gallstones in the neglected cases.

Its consideration may be divided briefly into parts: (1) The

indications for surgical intervention. (2) The results of surgical intervention. (3) The contra-indications for surgical intervention.

1. *The indications for surgical intervention* in cases of gallstones I consider to be as follows: (1) Repeated attacks of biliary colic. (2) Hydrops of the gall-bladder. (3) Stone in the common duct. (4) The existence of any of the complications, especially of the acute infections. The first three of these conditions do not demand immediate operative procedures in all cases; the last nearly always does. The diagnosis of gallstones is not of necessity an indication for operation, yet many attacks should not be permitted to occur; else the pathology becomes vastly more complicated and the patient's chances much poorer. I have had but one case in which, after gallstones had been passed, absolutely none were found at operation, either in the gall-bladder or the bile ducts. Spontaneous cure in cases of cholelithiasis then is rare; cure by medicines impossible. The same is true in the case of adhesions. Surgery offers these patients their only chance of ultimate cure, and is the treatment of choice, and of safety where no complications exist.

2. *The Results of Surgical Intervention.* These fully warrant its use. Of the 217 cases of biliary disease in this series, with all conditions included, that came to operation, 30, or 13.8 per cent., died. These are to be subdivided as follows: Of the 182 cases of cholelithiasis, 27 died, or 14.8 per cent. Of the 35 cases of non-calculous cholecystitis, 3, or 8.5 per cent., died. The mortality in cholecystostomy in simple cholelithiasis in 45 cases was but 4.4 per cent., and in all cases of stone (except hydrops) in which there was not acute inflammation it was 10.6 per cent., 11 cases in 104. In cholelithiasis with acute cholecystitis, 10 cases out of 54, died or 18.5 per cent. In cholelithiasis with abscess, 2 of 6, or 33.3, per cent. died. In hydrops, 3 of 12, or 25 per cent., died.

These mortalities are low when we consider that the cases include all the severe infections, with 31 empyemas and 17 cases of gangrene, the chronic cases with many adhesions, deep jaundice, and even those operated on as a last resort when almost moribund from cholemia. In addition I have operated upon 3 patients not in the above series, in which the indication for operation was an acute diffuse cholangitis; 2 had gallstones, 1 did not. They all terminated fatally.

These mortality statistics point most strongly to the comparative safety of early operation and the high mortality in cases complicated by purulent infection or chronic cholemia.

As to the nature of the operation performed, I may state that in cholelithiasis there were performed, in 182 cases:

	Cases.
Ideal cholecystotomy in	4
Cholecystostomy in	72
Cholecystostomy and choledochostomy[4] in	34
Cholecystectomy in	36
Cholecystectomy and choledochostomy	29
Choledochostomy	5
Cysticus drainage	1
Cholecystenterostomy	1
Total	182

Before considering the contra-indications to operation it might be well to consider the causes of death in the fatal cases. Of the 25 cases of cholelithiasis that died as a result of operation, 10 had acute cholecystitis (including empyema), 2 had abscess outside of the gall-bladder, and 1 had carcinoma. These conditions alone were very unfavorable, and in all probably the result of too great delay in bringing the patient to operation.

Six patients had conditions in addition to the local gall-bladder disorder unfavorable to recovery: One fatal case was in a subject seventy-nine years old who had had lobar pneumonia twelve weeks prior to operation; another occurred in a subject sixty-eight years old. One patient was a chronic alcoholic. Another was markedly anemia (the hemoglobin percentage being 41). Adiposis and myocarditis were marked in one case. Myocarditis and cholemia were present in one case of chronic choledochus obstruction.

The direct causes of death in the 27 cases were: Uremia in 3; hemorrhage in 4; primary shock in 8—of these, 4 were septic and 1 cholemic; exhaustion in 3; sepsis in 1; general peritonitis in 1; anesthesia in 1; liver abscess and cholangitis in 2; malformation of stomach and vomiting in 1; secondary shock in 1; general peritonitis following pneumonia in 1; cause unknown in 1.

3. *The contra-indications to operation* may then be summarized as follows: Organic lesions of the heart, lungs, and kidneys; extreme age; anemia or slow coagulability of the blood; and cholemia.

The main features concerning surgical treatment which must be borne in mind are these: that it is absolutely necessary to a cure in most cases of chronic biliary infections, whether calculous or non-calculous, and that when undertaken early the risks are infinitesimal compared to those encountered when complications have set in. A knowledge of the contra-indications and failures should not deter us from operation, but lead us to operate earlier and oftener in suitable cases. The permanent cures thus will be greatly increased and the mortality correspondingly lowered.

[4] In double operations choledochostomy is used to include hepatics or cysticus drainage.

RUPTURE OF THE KIDNEY, WITH REMARKS UPON CONSERVATIVE OPERATIVE TREATMENT.[1]

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The object of this contribution is to place upon record 4 cases of subparietal injury of the kidney which have been met with in my experience at the Episcopal Hospital, Philadelphia, and which were treated surgically by conservative measures, and to consider the question of the employment of such means rather than the radical one of nephrectomy, when possible, in the treatment of this class of injuries.

Case I.—*Rupture of the left kidney with laceration of the peritoneum and severe hemorrhage into the abdominal cavity; fracture of the tenth rib; laparotomy and lumbar incision; gauze packing; recovery.*

Jacob B., aged twenty-five years, a farm hand, was admitted to hospital at 3.30 A.M., on April 14, 1901. Late in the afternoon of the preceding day he fell from and was run over by a heavy farm wagon which he was driving.

On admission the patient complained chiefly of pain in the left chest, and stated that he had passed bloody urine. The abdomen was markedly distended and the muscles rigid, especially in the lower part. Examination further disclosed a fracture of the tenth left rib near its angle. The only visible marks indicating that the man had been run over were a contusion in the left axilla and an abrasion of the left arm. The temperature was 99°, pulse 80, and respirations 40. Later in the morning some fourteen ounces of bloody urine was obtained by catheter. It was found that the patient had a stricture of the urethra, the result of traumatism some years previously, and for several days after admission, until dilatation had partly relieved the condition, the catheter had to be relied upon entirely.

I first saw the man toward evening on the 14th, about twenty-four hours after the injury. The pulse had then become more frequent, the countenance pinched and anxious; there was abdominal pain and the distention had increased, and hematuria continued. I decided upon immediate operation.

Opening the abdomen by an incision through the outer border of the left rectus muscle, I found a great quantity of blood and clots in the peritoneal cavity, and on searching for its source quickly dis-

[1] Read at a meeting of the American Surgical Association, Washington, D. C., May 7, 8, and 9, 1907.

covered a tear in the peritoneum over the left kidney which was ruptured and bleeding. Placing a pad of gauze firmly over the kidney to control temporarily the hemorrhage, and finding no intra-abdominal organ injured, the abdominal incision was closed after mopping out the blood and clots and inserting a glass drainage tube in the pelvis. The patient was then turned on his right side, and the left kidney exposed by an oblique lumbar incision. A large amount of blood and clots distended the region about the kidney, and were removed, and the kidney was found to have been lacerated in several places, mostly in its lower half. Strips of iodoform gauze were firmly packed about it, controlling the hemorrhage, and the angles of the wound sutured. While on the operating table the patient's condition became so bad, that, in addition to free hypodermic stimulation, normal saline solution was given both by intravenous transfusion and by hypodermoclysis.

After operation the pulse was 124, and the temperature 99.4°. During the night the condition twice became alarming from symptoms indicating œdema of the lungs.

During the next two days the pulse varied from 130 to 144, and the temperature rose once to 101.6°. Thereafter both gradually fell, the chart showing nothing of especial interest.

The urine, the day following operation, contained a large amount of flocculent sediment of the color of iron rust; there were a moderate trace of albumin, a considerable number of red corpuscles, and a few granular casts. On the 19th, it was noted that it was slightly acid, contained a faint trace of albumin, a few clumps of pus cells, and numerous bacilli. On the 22d, it was alkaline, contained more pus cells and very numerous bacilli. On the 23d, a culture from the urine (still drawn by the catheter) was made, and the organisms were found to be streptococci and the bacillus aërogenes. Shortly thereafter the number of bacteria became greatly reduced, salol having been given for a number of days. The urinary infection was more than likely produced by the catheter.

The general condition improved steadily from the third or fourth day, by which time abdominal distention had disappeared. The abdominal drainage tube was then removed, the incision healing without incident. From the lumbar incision there was rather profuse colorless discharge (urine) by the fifth day; this continued in quantity for several days. The gauze packing was entirely removed by the tenth day, and a wick of gauze was inserted to maintain drainage. The fistulous tract closed quite slowly, but finally healed soundly, the patient being discharged from the hospital on July 17.

CASE II.—*Rupture of the right kidney with laceration of the peritoneum and hemorrhage into the peritoneal cavity; laparotomy and lumbar incision; gauze packing; death from secondary hemorrhage.*

Paul F., aged sixteen years, was admitted to hospital on the evening of June 4, 1904. While playing ball in the street he ran

in front of a trolley car, the fender of which struck him in the right hypochondriac region and on the head.

On admission there was found an ecchymosis of the upper right side of the abdomen and a contusion of the right side of the head and face. The boy was pale, his pupils dilated, but responding to light. The pulse was 100 and the temperature 100.4°. There was some abdominal pain and distention, but no muscular rigidity. Bloody urine was voided. Vomiting occurred during the night. Under stimulating treatment the condition improved.

By the next day the general condition was much improved, and the boy suffered less pain.

On June 9 the patient complained of great abdominal pain, and tenderness in the lumbar region had increased. In view of these symptoms I operated, choosing the abdominal route.

The abdomen was opened through the right rectus muscles. No visceral injury was found, but there was a small quantity of blood in the peritoneal cavity coming through a tear in the peritoneum overlying the right kidney, the region about which was distended by a large hematoma. Closing the abdominal wound I exposed the kidney by an oblique lumbar wound. The removal of blood and clots was followed by a great gush of blood which was controlled by the introduction of iodoform gauze packs about the kidney. The organ had been nearly bisected by a transverse tear somewhat above its middle.

After operation the patient's condition was very bad, the pulse being 160. Reaction, however, took place, though slowly, and in forty-eight hours the condition was decidedly improved. Some bloody oozing into the dressings occurred. The temperature rose on the second day to 103°, but shortly afterward a gradual fall took place; the pulse also came down at the same time. The patient did very well, although some urine escaped from the wound, until June 22.

On that day in the forenoon, the balance of the gauze packs were entirely removed by the resident physician. At 12.30 P.M., on visiting the ward, I was struck by the pallor and restlessness of the boy, and going to the bed-side and lifting the sheet I found that he was bleeding badly from the wound, the dressing being saturated and a quantity of blood in the bed. The wound was quickly and firmly packed with gauze, which controlled the hemorrhage; intravenous transfusion of normal saline solution was given, and free hypodermic stimulation employed. The patient's condition forbade any attempt at immediate operation, but I hoped that reaction might occur sufficiently to permit nephrectomy to be done. No improvement took place, however, and the boy died at 8.30 P.M.

CASE III.—*Rupture of the right kidney; fracture of the tenth and eleventh ribs and of the transverse processes of the first and second lumbar veterbræ; lumbar incision; gauze packing; recovery.*

Barney McG., aged fifty years, a laborer, while at work at a coal wharf, was struck in the back by a heavy iron bucket. He was brought immediately to the hospital, where he was admitted in the afternoon of December 17, 1904.

Examination disclosed a large hematoma in the right lumbar region, which was exceedingly tender. The patient voided urine containing a large amount of blood. A diagnosis of ruptured kidney was made, and I operated immediately.

Making an oblique lumbar incision, the kidney was exposed and delivered. There were a number of lacerations of the convex border and of both the anterior and posterior surfaces, as well as several contusions. The transverse processes of the first and second lumbar vertebræ and the last two ribs were fractured, and the hematoma was found to extend between the muscle planes of the loin. While the pedicle of the kidney was firmly held, preventing hemorrhage, loose fragments of bone were removed and the sharp bases of the fractured transverse processes of the lumbar vertebræ were cut off with bone forceps. Iodoform gauze packs were then placed carefully about the kidney, which was returned, and the wound was sutured in part. After operation the bladder was washed out, and there is no note of any recurrence of hematuria.

The highest temperature recorded after operation was 101° on the second day, and the pulse rose no higher than 118, the first observation after operation. During the first seven days the smallest amount of urine voided was 26 ounces on the third day, the largest, 56 ounces, on the seventh. During the first forty-eight hours there was some bloody oozing into the dressing.

The progress of the case was satisfactory thoughout, and the patient was discharged on February 11, 1905, with a small sinus remaining, but no urine excaped from it.

CASE IV.—*Rupture of the left kidney; lumbar incision; gauze packing; recovery.*

James A., aged six years, was admitted to the hospital on May 4, 1905, having fallen from a pile of lumber upon which he was playing. He was brought at once by his mother to the dispensary of the hospital, where his condition was found to be such that he was sent to the receiving ward.

On admission, his appearance indicated shock. His lips were pale, but the pulse was, however, only 96, and the temperature normal. There was no mark of injury to be seen, but the child complained of pain and was tender to pressure in the left lumbar region. Bloody urine was obtained by catheter.

When I saw the boy, not long after his admission, I determined that his condition was due to hemorrhage from a rupture of the kidney, and operation was promptly done.

Opening the loin by an oblique lumbar incision, the kidney was exposed and delivered; a quantity of blood and clots was removed

from the surrounding tissues. There were many small tears of the convexity and anterior surface of the organ, but it was most severely injured at its lower pole from which quite a large piece was entirely detached. This was removed. Iodoform gauze packs were placed over the lacerations, and the kidney was replaced and held firmly by hammock strips of gauze at its poles. The wound was partly closed by silkworm-gut sutures.

The next day the patient's temperature rose to 101.8° and the pulse was 148. Bloody oozing saturated the dressings and the child had two severe convulsions, the nature of which was not noted. Thereafter he did very well, both temperature and pulse gradually becoming normal. The daily amount of urine voided during the first week varied from 15 to 20 ounces. On the ninth day the packing was removed from about the kidney, no bleeding occurred, and a small gauze drain was inserted. Several days later it was noted that there was a slight discharge of urine from the wound, but this lasted only for a few days.

On June 24 the boy was discharged, the wound being completely healed.

In connection with these cases mention may be made of an instance in which a severe rupture of the liver was associated with rupture of the right kidney, hemorrhage from both organs being controlled by gauze tampons. This case occurred also in my service at the Episcopal Hospital, and was reported to the Philadelphia Academy of Surgery, in April, 1903.[2]

The patient was a man, aged twenty-six years, who, while engaged in decorating a church fell from a step-ladder a distance of ten feet, striking his right side upon the end of a pew. With assistance he was able to walk home where he remained until the morning of the third day after his injury, when he was admitted to the hospital. During the sixty hours preceding admission there had been pain over the lower right ribs, distress from accumulation of gas in the stomach, some general abdominal distention, hematuria, and twice hematemesis.

At the hospital the man's condition was found to be clearly indicative of hemorrhage: pallor of the lips and conjunctivæ, pulse 120 and scarcely perceptible, temperature 97.5°. There was tenderness in the right upper quadrant of the abdomen with rigidity of the rectus muscle; the liver dulness extended two and a quarter inches below the costal margin; the patient once vomited a small quantity of blood and voided bloody urine. The leukocyte count was 12,000.

Stimulation by tincture of digitalis and strychnine hypodermically, and normal saline solution by hypodermoclysis was employed, before operation, which was done a few hours after admission.

While the hematuria pointed to a renal lesion, the localized abdomi-

[2] Annals Surg., 1903, xxxviii, 121.

nal tenderness with rigidity of the upper part of the right rectus muscle and the increase in the liver dulness indicated injury of the liver, and accordingly the abdomen was opened through the right rectus muscle.

A large amount of blood and clots was found in the abdominal cavity, the hemorrhage having occurred from a number of lacerations on the upper and lower surfaces and the posterior border of the liver, as well as from the upper pole of the right kidney which was also ruptured and bleeding into the abdomen through a rent in the peritoneum overlying it. Hemorrhage from both organs was effectually controlled by iodoform-gauze tampons placed firmly against the lacerations. To afford thorough drainage a second wound was made posteriorly between the eleventh and twelfth ribs, and one end of each gauze pack was carried through it. Recovery without incident occurred, the patient being discharged from the hospital fifty-one days after operation.

The literature of the subject of renal injuries, since the publication in 1878 by Maas,[3] of Freiburg, of a study of 71 collected cases, has grown, through the contributions of many writers, until it may be considered, in view of the infrequency of such cases in individual experience, to have reached fairly abundant proportions. Before the American Surgical Association, in 1896, W. W. Keen[4] read a paper with tables of 155 cases, not including those of Maas. In the same year Küster[5] published a study of 306 cases. In 1899, Tuffier,[6] contributed an investigation into 198 cases. Delbet,[7] in 1901, went over the literature and analyzed 320 cases. In 1903, Francis E. Watson,[8] wrote a most admirable, exhaustive, and analytical paper based on 660 cases, including all published up to June of that year; 6 being cases of his own. In February of the present year, A. H. Barkley[9] published a "Tabulation of Cases and Bibliography of Ruptured Kidney," comprising 95 cases. Of these, however, all but 16 are included in the period covered by Watson's paper. In addition to these 16 cases published since June, 1903, given in Barkley's table, I have been able to find in the literature, from that time to date, reports of 14 more, which, with the 4 here reported, make a total of 34 cases recorded since Watson's paper. The 14 cases alluded to have been reported by Mathieson,[10] Riddell,[11] C. A. Smith,[12] Cahen,[13]

[3] Deutsche Zeitschr. f. Chir., 1878, x, 126.
[4] Trans. Amer. Surg. Assoc., 1896, xiv, 293.
[5] Die Chir. Krankh. der Nieren. Deutsche Chir., Lief. 52b., 196, Stuttgart, 1896.
[6] Duplay et Reclus' Traité de Chirurgie, 2d Ed., 1899, vol. vii, 164.
[7] Ann. des mals. des org. genito-urin., 1901, xix, 669, 805.
[8] Boston Med. and Surg. Jour., 1903, cxlix, 29.
[9] Louisville Monthly Jour., Med. and Surg., 1907, xiii, p. 307.
[10] Quart. Med. Jour., Sheffield, 1902-03, xi, 134.
[11] Scot. Med. and Surg. Jour., Edin., 1903, xiii, 54.
[12] Northwest Med., Seattle, 1903, i, 385.
[13] Münch. med. Woch., 1903, l, 2205.

Mauclaire,[14] Chaput[15] (3 cases), Edington,[16] Michel,[17] Ninni,[18] Franklin,[19] C. B. Keetley,[20] and M. B. Miller.[21]

A study of these papers, tables, and case reports has been made with the object in view of ascertaining the results of surgical treatment of rupture of the kidney by packing, drainage, or suture of the renal wound, as compared with those of nephrectomy, and of determining the limitations within which conservative treatment may properly be employed. At the outset it is obvious that the comparison is not entirely a fair one, since it has to deal with the results of injuries which, in different cases, vary in extent, and which may or may not be associated with other and often grave injuries, as laceration of the peritoneum with hemorrhage into the abdominal cavity, injury of the abdominal viscera, or injuries of other parts of the body, themselves threatening life.

The highest mortality in subparietal injuries of the kidney is found in the cases not treated by surgical measures. Watson's analysis gives 270 cases, without complication, subjected to expectant treatment, with 81 deaths—mortality 27 per cent.; and in 56 with complications, and treated expectantly, there were 51 deaths—mortality 91 per cent. Keen, comparing the results of cases in which nephrectomy was done with those in which it was not, found a death rate in the former of 36.4 per cent., and in the latter 44.2 per cent.

As to the comparison between the results of treatment by conservative operation and those of nephrectomy, Watson's statistics favor the former procedures. Thus, he found that in 99 cases free from complication, treated by operations other than nephrectomy, there were but 7 deaths—mortality 7 per cent.; and that in 15 complicated cases so treated there were 7 deaths—a mortality of 46 per cent. In 115 cases not complicated and treated by nephrectomy, there were 25 deaths—mortality 21 per cent.; and in 45 cases having complications, 19 deaths or a mortality of 42 per cent.

From the 34 cases, including those herewith reported, added to the literature since the publication of Watson's paper, the following statistics are obtained:

CASES WITHOUT COMPLICATIONS.

Treated by conservative operation.	Cases.	Deaths.
Lumbar incision, suture of renal wounds, with drainage	2	0
Lumbar incision, gauze packing or drainage.		
Primary	5	2
Secondary	1	0
Nephrectomies.		
Lumbar primary	6	2
Lumbar secondary	5	2
Abdominal, primary	5	1
Abdominal, secondary	1	0

[14] Bull. et. mém. Soc. anat. de Paris, 1904, lxxix, 332-336.
[15] Bull. et mém. Soc. de chir. de Paris, 1905, N. S. xxxi, 402.
[16] Glasgow Med. Jour., 1905, lxiii, 84. [17] Rev. méd. de l'est, Nancy, 1905, xxxvii, 84.
[18] Gior. internaz. d. sc. med., Napoli, 1905, N. S., xxvii, 635.
[19] Amer. Jour. Surg., 1906, xx, 309.
[20] West Lond. Med. Jour., 1906, xi, 110. [21] Annals Surg., 1907, xlv, 306.

CASES WITH COMPLICATIONS.

	Cases.	Deaths.
Gauze packing and drainage.		
Primary	2	0
Secondary	1	0
Nephrectomies.		
Lumbar, primary	2	0
Abdominal, primary	4	2

Of the 11 cases treated by gauze packing, suture of the kidney, or drainage, 2 died—mortality 18.1 per cent. The causes of death were, shock and collapse in 1 case, secondary hemorrhage in the other.

Of the 23 cases in which the kidney was removed 7 died—mortality of 30.4 per cent. The causes of death were: suppression of urine, 2; septicemia, 1; shock and hemorrhage, 2; peritonitis, 1; not stated, 1.

The showing in cases not dealt with by nephrectomy is so favorable as compared with those in which the organ was removed that it cannot fail to attract attention. It may be said that probably the difference is largely due to the fact that in the cases so treated the kidney was less severely injured than it was in those included in the other group. This, however, does not apply to many of the cases, for in some of them which I have studied, the kidney had suffered greater traumatism than in some of those in which nephrectomy was done.

Surgical interference in rupture of the kidney is called for, in the first place, for the control of the hemorrhage and the prevention of extravasation of blood or of urine into the tissues, or into the abdominal cavity, in case the peritoneum be torn; second, for the treatment of injuries of other organs which may have occurred in addition to that of the kidney; third, to place the injured kidney, whenever possible, under circumstances most favorable to repair; and, fourth, to provide means against the occurrence of infection.

When there are sufficient grounds for belief that hemorrhage is taking place—lumbar tumefaction, severe or persistent hematuria, evidence of fluid in the abdomen, with constitutional proofs of bleeding, or if, in addition to indications of lesion of the kidney, there be signs indicating the possibility of injury of the intestines or other abdominal organs—operation should be done without delay.

So-called expectant treatment is permissible only in cases in which the local symptoms are insignificant, constitutional symptoms absent, and slight hematuria alone directs attention to the probability of renal injury. Of cases of this type there are not a few, and to their almost invariable recovery can be given the largest share of the credit due to non-surgical treatment.

When operation is to be done, the choice as to whether the abdomen should be opened or the renal region alone exposed by lumbar incision must be made after consideration of the symptoms presented in individual cases. Rigidity of the abdominal muscles with general

or localized renderness, or dulness in the flanks on percussion, if present in addition to tumefaction and tenderness in the lumbar region, should make the decision in favor of laparotomy; while the absence of signs except in the lumbar region or the predominence of the latter, indicate lumbar incision as the proper course to pursue. Should abdominal section be done the loin also should be opened to provide for dependent drainage, whether the kidney be removed or not.

Should lumbar incision be chosen, the kidney having been exposed and brought out of the wound, blood and clots having been first removed from the surrounding region, hemorrhage temporarily controlled by pressure of the organ or its pedicle, and the extent of the injury ascertained, the question arises as to whether or not the organ may be spared. In those instances in which violence has been so great as to pulpify it completely, or for the most part, no more doubt as to the necessity of its removal can be entertained than could arise if the kidney be found entirely severed from its pedicle. Likewise nephrectomy should be done if one of the main vascular branches has been torn, fatally interfering with the circulation in a large portion of the organ. And again, no other course of action should be considered but the removal of a surgically diseased kidney, if ruptured.

But other cases will occur in which a single, or even two clean tears nearly or quite divide the kidney, and others, more in number, having several or many more or less deep lacerations and contusions at other points, in which an effort to save the organ is justified. The ease and promptness with which repair of wounds of the kidney takes place is well recognized. It is relied upon in our operations of nephrotomy, whether done for the removal of stone (in which cases more than one wound through the substance of the kidney is not seldom made), or for other causes.

It seems, therefore, to be entirely reasonable that every attempt should be made to save the ruptured kidney, if there seem to be fair grounds for thinking that its vitality is not threatened beyond reasonable hope, or that enough secreting tissue is likely to survive the injury to make preservation of the organ worth the while. Should a portion only of the kidney be badly mutilated, or even detached, it need not necessarily cause sacrifice of the whole of the organ. Partial is preferable to complete removal.

For the control of hemorrhage the firm packing of gauze, either plain sterile or iodoform gauze, into or against the wounds, whether of the substance of the kidney or of its pelvis, is entirely reliable, and, more than that, it can be quickly done, which is a point of value, and in addition it serves well for drainage. Loops of gauze passed beneath each pole of the kidney before it is replaced serve not only to hold it in position, but afford firm support to the packs which can be introduced through the lumbar wound between the ends

of the hammock strips. For the drainage of any dead spaces that may remain outside of the packed area, rubber tubes should be inserted.

Another and, when applicable, perhaps a neater way of controlling hemorrhage is approximation of the renal wound or wounds by means of mattress sutures of chromicized catgut. This measure does not seem to have met with general favor, however, or else the number of cases in which it could be employed is small, for Watson mentions but 8 instances, and I have found only 2 more in the cases since recorded, making in all 10 cases among 125 treated by conservative operation. Mathieson reports a case in which there were two large wounds transversely from the hilum, one of them almost bisecting the kidney. Catgut sutures controlled the bleeding effectually, and in three weeks recovery was complete. In a case reported by Chaput a single tear of the kidney was sutured. This patient also recovered, but bleeding from the wound continued for three weeks, and healing was not complete until three months had relapsed.

Cheyne and Burghard[22] speak of suture of the kidney as "much superior" to plugging, "and should be adopted whenever possible." It is suitable, however, in my judgment, only when the renal injury consists of one or more clean tears, and when the question of brevity of the operation does not have to be entertained; but when the wounds are lacerated and multiple, or when haste in operating is imperative, it is not available. If employed, drainage should be secured by a rubber tube.

Every recorded case in which the kidney wounds were sutured recovered, and in all but one of them the time of recovery was decidedly shorter than in the cases treated by gauze packing. But while recovery from operation was prompt in all but 1 of the cases (Chaput's) the ultimte result in 2, 1 recorded by Delbet and 1 by Watson, was not satisfactory. Secondary nephrectomy became necessary in Delbet's case, and was fatal; and in Watson's case a pseudohydronephrosis with fistula resulted.

In only 1 of the 5 cases which I have had could suturing have been done. In Case II, in which death from secondary hemorrhage took place, it may be that a different result would have been obtained if the single, clean, transverse tear had been closed by stitches. Should I meet with a similar case, and circumstances permit, I should suture the rent.

In spite of the advantage apparently offered by suturing, however, especially the shortening of the period of recovery, the number of cases to which it is adaptable must be small, and gauze packing satisfactory both for hemostasis and drainage, must be relied upon in a larger number.

[22] Manual of Surgical Treatment, 1903, Part vi, Section II, Chap. xix, 191.

It must be admitted that there are some disadvantages attending the latter method, chief among which are the length of time required for healing of the wound and the possible development of a fistula. Then there is the possibility of secondary hemorrhage, which has occurred in a few cases, and the chance, a small one, should infection of the damaged kidney or of the perirenal space occur, of its being conveyed by way of the bladder to the opposite kidney.

It is quite true that the time required for healing is much longer than it is when nephrectomy is done, and this is unavoidable. As to urinary fistula, it has in the recorded cases been persistent in but a very small number, and in my patients who recovered it healed without difficulty. Should it, however, resist all ordinary measures to induce healing, nephrectomy may ultimately be required. Secondary hemorrhage has occurred in but a very few of the cases treated conservatively, and can usually be controlled by packing, as in the first place, and a further attempt made to save the kidney. The conveyance of infection to the opposite kidney is, if proper attention be given to the bladder, practically a remote contingency, and should not be given undue weight.

The final question is whether the disadvantages of conservative treatment of the injured kidney are of greater amount to the patient than the loss of the organ would be, and whether the slight risks are not fully compensated for by the preservation of an organ of such vital importance.

A word as to the care of the bladder. It is of the utmost importance that it should be freed of blood and clots either by washing with boric acid solution or normal saline solution, which will usually suffice, or by the evacuator tube, if so filled with clot that washing is not effectual, or, if that means fails, by suprapubic cystotomy, which may also be required should a tight urethral stricture prevent the use of a catheter. For some days after injury irrigation of the bladder should be done, and, in addition, as a further safe-guard against infection of the bladder, urinary antiseptics may advantageously be given by the mouth.

ASPIRATION DRAINAGE IN THE TREATMENT OF EMPYEMA.[1]

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The length of time in healing and the persisting sinuses in many cases of empyema, particularly in those in which pus has been retained in the pleural sac for some time before operation, suggests that the methods of ordinary drainage are inadequate in many cases.

[1] Read before the Surgical Section of the New York Academy of Medicine, October 4, 1907.

Either because of the hindrance to expansion of a lung thickly coated with inflammatory exudate, and perhaps itself still affected, because of the unequal expansion of the lung, or because of insufficiently prolonged and effective drainage, each year a certain number of patients with persisting and discharging sinuses and contracted and misshapen chests present themselves in every hospital and clinic.

As the majority of patients get well through simple drainage, we have, I think, regarded the method of thoracotomy, with or without rib resection, and ordinary drainage as sufficiently successful, and have disregarded the smaller number of patients that drag on for months or years, and perhaps later, with shrunken chests and worse complications, are obliged to have one of the radical procedures to obliterate the pus producing cavity or tract.

Having been interested in the subject of drainage in these cases, I have in the past tried a number of schemes to facilitate it, but without any great success until the present year with aspiration drainage. Since a perusal of Dr. Bryant's article upon "Aspiration Drainage in a Case of Traumatic Empyema," in *Jacobi's Festschrift*, I have this year tried the method in all cases of empyema and of persistent sinuses of the pleura with so much success that I think the method worthy of further record and more general adoption.

A brief review of the history of surgical drainage in empyema, I think, is of interest, more than this being unnecessary in view of the works of Bouveret in 1888, Cestan's in 1898, and Bryant's article of 1906. While thoracotomy dates from the time of Hippocrates, it was not until after 1600 that even the trochar and cannula came into use. Surgical drainage appears to have been introduced by Chassaignac about 1859. Potain, in 1869, seems to be the first to have applied the siphon tube to evacuate the cavities in empyema. The evacuation was made through a trochar and cannula opening. Playfair in England, in 1872, introduced a siphon drainage by means of a long tube resting in a vessel of water, later arranged to permit of ambulatory treatment. This was one of the first continuous drainage appliances. Bülau, in 1876, introduced a similar method, an "aspiration procedure," and that for the first time was said to cure by lowering intrapleural pressure. Tachard, in 1874, and Revilliod, in 1880, again and apparently independently reported the use of permanent siphonage after pleurotomy. From the latter year the method became more popular on the continent, but was never generally adopted. From 1884 to 1889 Storch used the Bunsen aspirator, pus being drawn through a tube into an intermediary partly exhausted bottle.

Much complicated apparatus was evolved from this by followers in the succeeding years. In 1890, Phelps and Gilman Thompson, after animal experiments in the Loomis Laboratory, advocated valvular drainage after thoracotomy by valve flaps over the end of

drainage tubes or a special apparatus containing such valves. O'Dwyer about the same time recommended this procedure after demonstrating by animal experiments the truth of the statement made by A. H. Smith in 1869, and by Frentzel in 1876, that the "compressed lung by fits of coughing and other expiratory efforts, with a more or less closed glottis, fills itself with air from the sound lung." If, therefore, intrapleural pressure can be removed, the lung rapidly expands. Northrup and Chapin in the same year advocated the procedure in children. Williams, of Liverpool, as early as 1878, and Menzies Hutton, of London, in 1893, independently made such an apparatus. In 1898 Perthes introduced *direct* aspiration by means of Bunsen's hydraulic pump with a manometer attachment showing the degree of negative pressure. He advocates the procedure for the radical cure of empyema.

It will be noticed that these procedures, with the exception of valvular drainage (which does not admit of perfect drainage), are scarcely ambulatory methods, and confine the patient either to the ward or his bed. The use of a collapsible, resilient rubber bag, the Politzer bag, which appears to have been first used by Bryant, is all that is necessary to make the treatment a distinctly simple and ambulatory one, permitting the patient to be up and out of doors as soon as he is able to leave his bed and with the continuous benefit of aspiration drainage.

A study of the healing cavity in the chest in empyema shows that it is closed in much more rapidly from side to side by lung expansion than from above downward, and it is in this factor that the danger of pocketing and retention by unequal expansion lies. In delayed sinus healing unequal lung expansion and the more rapid progress of the skin and fascial planes may so shut off the tract as to interfere with proper drainage. With a lung that has been compressed for a long time by purulent exudate the adhesions are so dense and the exudate so thick that some of them never expand again under simple drainage. Such a lung needs, in addition to pressure from within, not only the removal of pressure from without, but the establishment of a *decided negative pressure*. There are certain patients operated early, but in whom, nevertheless, even with good simple drainage, a sinus of considerable length persists. While I believe the method of aspiration drainage of greater value in the older cases of empyema and in the persisting cavities and sinuses, it has in the simple cases answered so well that I have used it as a routine procedure in all cases. The length of time that a lung may be compressed and still again expand is well shown in Case VI of the series, in which, after three years of pus in the chest with an imperfectly drained large cavity communicating with a bronchus, the lung was made to re-expand and fill its side of the thorax.

The amount of negative pressure required to overcome spastic contraction of the lung itself is slight, and has been variously esti-

mated by Wintrich and Donders to be from one-eightieth to one one-hundredth part of an atmosphere. A lung coated with exudate and adherent may stand a higher degree of vacuum, but the constant effect of even so small an amount as that above mentioned seems sufficient in time. Too strong an aspiration at the start causes a sense of thoracic constriction and cough, and may tinge the exudation with blood.

It has seemed to me, in watching these cases, that in addition to the direct effect of expansion upon the lung there is a certain amount of Bier's passive hyperemia. Certainly dirty exudate is more rapidly thrown off and granulations stimulated and purulent exudate changed to seropurulent and serous than by any method I have ever seen.

The method of procedure that has seemed to me the best is to wait for several days after operation, usually done with resection of three-fourths of an inch or an inch of rib, to allow the escape of the major part of the purulent material; then to substitute a single tube of 35 to 40 French caliber, inserting it two and one-half inches to three within the pleura and packing about it iodoform gauze or absorbent cotton saturated with boric acid ointment. A piece of dentist's rubber dam four inches square with a small hole cut in it is stretched over the tube and run down to the side of the chest. This is overlapped by strips of two-inch adhesive plaster. (Figs. 1 to 4). A circular wad of absorbent cotton is placed about the tube and a chest binder put on with the tube coming through. A glass connecting piece and smaller tubing connects the Politzer bag. (Figs. 5 and 6). A number of devices of various materials have been made to secure an air-tight joint at the chest, but the above has been found simple, inexpensive, and more easily adapted to thin and angular chests, and I have seen it last for more than two weeks without leakage. Patients soon become outdoor cases and the bags are easily held under the clothing, and can be emptied as required by the patient and replaced. We endeavor to change the dressing every week and note the lung expansion and vertical depth of the cavity or sinus. When the lung has expanded and comes in contact with the tube all about, which it frequently does in an astonishingly short time (we have seen it in a week after application of the aspiration), the tube is shortened, provided the vertical depth is shortening or is very narrow. In this way the tube is gradually removed as the cavity is obliterated.

It has been supposed that fibrin coagula would occlude the tube and prevent drainage, but practically this has very seldom occurred, and is easily remedied by probing up the tube or its removal, when the clot comes away sticking in the end of the tube. I have seen fibrin strings well down the drainage tube without interfering with the flow of pus.

I have used this method of aspiration drainage in eight cases at St. Luke's and Trinity Hospitals. Upon the ward patients at the

former I have had the privilege of operating through the courtesy of Dr. Abbe, in whose service they occurred.

CASE I.—Private patient; man aged forty-two years. Empyema of the right chest, following pneumonia six weeks before entrance. Patient much emaciated and had retained an immense purulent collection in the chest certainly for three weeks, if not longer. Operation January 23, 1907: Portion of the eighth rib below the angle of the scapula resected under local anesthesia. Lung greatly compressed and shrunken and adhesions dense. Four days later the Politzer bag was connected to a single drainage tube, and the

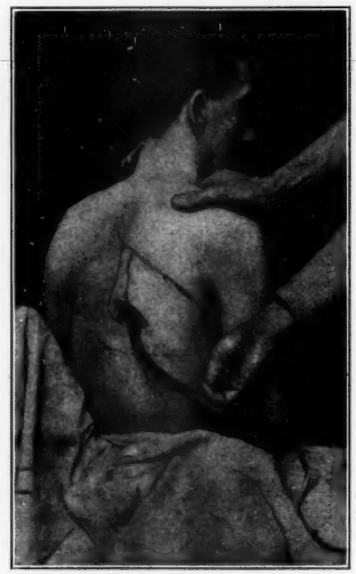

FIG. 1

FIG. 2

FIGS. 1 and 2.—Successive steps in the application of the aspiration drainage, and the means of obtaining an air-tight joint at the wound.

patient was allowed up in a chair for a short time. A week later the dressing was changed and the cavity in the chest found but little more than half the size it was at operation. Two weeks later the cavity measured 6½ by about 2 by 1½ inches by uterine sound. On discharge, February 20, 1907, just four weeks after operation, a sinus four and one-half inches long and the size of the drainage tube (30 French) remained. On March 16 the wound had healed and the patient had gained more than twenty-five pounds in weight. In forty-seven days after the institution of aspiration drainage the wound was healed.

CASE II.—Man, aged thirty years. Empyema of the right chest following pneumonia. Transferred from Medical Division and operated on February 4, 1907. Resection of portion of the seventh rib in posterior axillary line; empyema cavity of average size. February 11, one week after operation, but slight expansion of the lung was noted and the Politzer bag was connected. Three days later there was a very appreciable lung expansion and increased discharge. On February 19, the ninth day of the bag drainage, the cavity had contracted to a size scarcely larger than the drainage tube and the walls were clean and granulating, drainage thin and

FIG. 3

FIG. 4

FIGS. 3 and 4.—Successive steps in the application of the aspiration drainage, and the means of obtaining an air-tight joint at the wound.

seropurulent. On March 2, the eighteenth day after the application of the Politzer bag, the patient was discharged with a small healing probe sinus about one and one-half inches deep, requiring small external dressings only. Aspiration drainage was used but nine days in this case, which was a simple empyema with early operation.

CASE III.—Boy aged nineteen years. Empyema of the left chest following pneumonia. Transferred from the Medical Division and operated on, April 8, 1907. Resection of the seventh rib in the post-axillary line; cavity of considerable size; heart displaced to right. April 14, aspiration drainage. April 25, it was found the cavity

measured four and one-half inches vertically and the lung had contracted down about the drainage tube. The aspiration was discontinued and Bier's cupping tried twice a day, but this, I believe, was a mistake, as the wound closed too rapidly and the lung nearest the wound expanded, and partial pocketing was the result. The aspiration was again put on for about a week. On May 7 the sinus measured three and one-half inches and was of small probe size, and he was discharged with external dressings only. He had a small reaccumulation shortly after discharge, but upon evacuation the wound closed completely. Time, I think, was lost in this case by too early removal of aspiration and by the technical mistake

FIG. 5

FIG. 6

FIGS. 5 and 6.—Final application of the binder in the dressing.

of cupping instead of aspiration drainage through a tube, which prevents the lung expanding and closing off the sinus before the distal portions are healed.

CASE IV.—Man, aged twenty-eight years. Empyema of the right chest following pneumonia four weeks before admission. Operation May 15, 1907; cavity of moderate size. May 17, Politzer bag put on. Five days later (May 22) the chest cavity had contracted to a space three and one-half inches vertically by about an inch laterally. May 31, the chest cavity measured two and one-quarter inches in depth by one-half inch, and the further expansion of the lung was prevented by the drainage tube. Being mindful of the last

case, a tube of 30 French caliber was reinserted one-and one-half inches and aspiration instead of cupping continued. On June 7, twenty-three days after operation and twenty-one days after the beginning of aspiration drainage, the patient was discharged with a shallow small probe sinus, which was healed June 10.

CASE V.—Boy, aged six years. Empyema of considerable size of the right chest, probably following pneumonia. Admitted and operated on June 19, 1907. Incision between the seventh and eighth ribs below and internal to the angle of scapula. On the third day Politzer bag attached, dressing forceps pass five and one-

FIG. 7

FIG. 8

FIGS 7 and 8.—Case VI, several weeks before discharge from the hospital. The dressing had been in place ten days. Drainage tube surrounded and built up with adhesive plaster.

half inches upward and back. It was very difficult to keep proper aspiration going in this case of a restless child, and the drainage apparatus more often acted as a plug than as an aspirator, so that it was eighteen days, on July 8, before the lung had expanded to the drainage tube, and the depth of the sinus was four inches. Two weeks more of interrupted drainage reduced the sinus to a narrow channel three inches long. I am undecided in this case whether it was not one of those examples of slowly healing sinuses that tend to remain open indefinitely because closing so slowly from above, lung expansion along the tract and skin closure pro-

ducing pocketing. For want of ward beds he was sent to the Out-Door Department with simple drainage, and was only healed a month later. I believe the time in healing would have been materially lessened had we been able to maintain efficient aspiration drainage.

CASE VI.—Boy, aged fifteen years. Three years before entrance had an acute empyema following pneumonia. He was operated upon at home by an intermuscular incision by his own doctor. A year later, because of a persisting sinus, he had a portion of rib resected and further drainage. On entrance he was emaciated and the left chest was flat and contracted and measured two and one-half inches smaller than the right. There was a small discharging sinus at the ninth rib anterior to the axillary line. A uterine sound could be introduced for five and one-half inches up and in and swept about, revealing a cavity of some size with dense walls. Rotating the sound inward the heart beat could be markedly felt. The apex beat was displaced to the edge of the sternum in the fifth interspace. There was a foul, copious, purulent expectoration of the same character as the discharge from the sinus, but containing no tubercle bacilli. Methylene blue solution injected into the sinus was expectorated. On June 5 the sinus opening was enlarged, eight ounces of pus evacuated, and the outgrowth of bone from the periosteum and rib removed to establish free drainage, and in the hope that the communication with the bronchus would close. Expectoration ceased five days later, and after ten days a soft Politzer bag with slight aspiratory force was put on and found to remain collapsed. The boy gained rapidly in strength and weight, and was soon able to leave his bed and be out of doors. Four weeks after the beginning of the aspiration he had gained twelve pounds, and the difference in the chest measurements (at the third interspace) was but one and one-half inches. A week later his cavity had narrowed to a sinus running upward and in, but four inches deep from the skin and admitting a 15 French catheter tube. (Figs. 7 and 8). Aspiration was discontinued and a simple shorter tube inserted. He was healed August 12, two months after the application of the Politzer bag, and had gained at this date twenty-four pounds in weight. The total duration of aspiration drainage was five weeks. He was made to take breathing exercises, stand erect, and to blow against resistance, all of which I believe materially aided the lung to expand, coupled with the negative pressure in the chest, later somewhat raised by a stiffer bag.

Two more patients were treated by aspiration drainage, but the case-histories cannot be reported in full, since one patient left the hospital after considerable progress in healing a sinus persisting after a former operation, and in the other aspiration was discontinued because of a severe coincident vulvovaginitis and isolation.

The simple cases of empyema operated upon early recovered

speedily. Those of longer duration before operation recovered more slowly, but still much faster and, I am convinced, more surely than with simple drainage. The value of the method is, I think, best shown in Cases I and VI. In tuberculous empyema with pulmonary involvement, or with pneumothorax, the method is scarcely applicable. Its routine employment in cases of empyema will make such procedures as Estlander's, Schede's, and Delorme's, I am sure, exceedingly rare.

THE RÖNTGEN-RAY TREATMENT OF HYPERTROPHIED PROSTATE.

By James W. Hunter, Jr., M.A., M.D.,
of Norfolk, Virginia.

The complete failure of medical treatment to afford any permanent relief in cases of hypertrophied prostate, as well as old age and an enfeebled constitution, makes this class of patients one of the most annoying that the practitioner is called upon to treat. Nor has surgical intervention been the precious boon that it apparently promised. The high mortality immediately attending the radical removal of the prostate, and the grave danger of infection following this and the Bottini operation, have naturally suggested some indirect measure. Thus, upon the assumption that a double oöphorectomy causes a marked reduction in the size of a fibroid uterus, the mutilating operation of castration has come largely into favor, and more recently that of vasectomy. Yet the object sought has not always been accomplished. In most cases, therefore, under the old methods of treatment, the best that could be done was to teach the patient the correct use of the catheter.

The atrophying action of the Röntgen-rays upon glandular tissues naturally suggests its application to the prostate; its especially selective action upon the genitalia would seem to confirm our suspicions. Thus Gautier,[1] of Paris, addressing the Congress of Sciences held at Montarban on August 7, 1902, says that in his experience nothing compares with the Röntgen-ray treatment of hypertrophied prostate. He used 2 ampères at 110 volts, directing the rays upon the perineum and lower abdomen, and thus secured a double benefit, that is, a diminution of the residual urine and a relief from the suffering, decided results being obtained in from four to eight sittings.

Carabelli and Luraschi,[2] however, were the first definitely to

[1] Brasil Medico, Rio de Janiero, 1902, xvi, 403.

[2] Gazetta degli Ospedali Milano, abstracted in Jour. Amer. Med. Assoc., September 2, 1905.

announce their experience with the new treatment. After waiting a year they reported, in August, 1905, 2 cases completely cured. In 1, a man aged sixty-years, the rays were applied some fifteen times, at first two or three times a week, then once a fortnight. The sensory symptoms entirely vanished, and urination became easier. The other patient was sixty-five years old. Here the prostate was greatly enlarged and hard, there being about 200 c.c. of residual urine and evidences of a chronic cystitis. After six sittings the residual urine was reduced to 40 c.c.; the urine itself was clearer, and urination easier. After 10 irradiations there remained but 10 c.c. of residual urine. The patient was dismissed as entirely cured.

On the other hand, Moszkowicz[3] reports 3 cases, aged respectively sixty-one, sixty-six, and seventy-seven years, all of whom had to lead a catheter life. On the day following the first sitting, the patient could urinate without the use of the catheter; a week later the prostate was softer and continued to decrease in size. But in the first case, seventeen days after the last irradiation, there was an epididymitis; in the second, fourteen days after, the symptoms of a hemorrhagic cystitis. Consequently the third case was treated only once. Naturally we must suspect some reason for these complications. Personally, I believe that the technique was at fault, and I shall discuss this later.

Tausard and Fleig[4] treated 2 cases. The first was that of a man aged sixty-three years, who had twice had an attack of gonorrhœa, at seventeen and twenty-seven years, respectively, each attack lasting about two years. At thirty-two he experienced a double orchitis. When first seen he presented the symptoms of prostatic hypertrophy, a rectal examination showing a tumor the size of a hen's egg. He was treated some nine months, receiving 13 irradiations, and was dismissed as cured. There was only one urination at night instead of five or six, while the residual urine was reduced from 50 c.c. to none. An exceedingly slight prostatic enlargement remained at the time of dismissal; the cure has been permanent. The second patient, though irradiated only four times, showed a marked improvement. A malignant growth of the intestinal tract, however, prevented further treatment.

Schlagintweit,[2] though not reporting any particular cases, states that he has irradiated 53 cases of hypertrophied prostate, of which 30 received more than three sittings. All of these 30 were greatly improved, although in his experience the residual urine did not decrease in proportion to the other improvements. In uncomplicated cases he considers the Röntgen-ray treatment superior to all other methods.

To these, I would add one case of my own:

[3] Münch. med. Woch., 1905, lii, 730.
[4] Annales des maladies des organes génito-urinaries, 1902, xxiv, 1841.
[5] Ztschr. f. Urologie, Band i, Nr. 1, 51–53.

Mr. G. Carpenter, aged eighty years, a widower. Suffered with a hyperacidity of the stomach and chronic cystitis of eight years duration, the urine showing a large amount of pus, but no involvement of the kidney. Other history negative. In December, 1906, he exerted himself too severely while placing a post, and as a result had a severe orchitis. This yielded to treatment, but on February 2, 1907, there was a beginning of prostatic symptoms, among others frequency of urination (arising as many as six times a night), with pain and burning about two inches from the end of the penis. In spite of treatment, however, the patient gradually grew worse until April 15, when he was able to void only about a half ounce of urine at a time. There was also a marked phosphaturia and about 60 c.c. of residual urine.

About this time I decided to try the Röntgen-rays as a last resort, operative intervention being manifestly out of the question.

May 2, first exposure, twenty-five minutes.

May 8, second exposure, twenty-five minutes.

May 27, third exposure, fifteen minutes.

Internal medication was then stopped, and the patient enjoyed complete comfort until June 27, when the entire train of symptoms returned much aggravated. He went to bed. On account of the patient's condition, and his inability to make frequent visits to my office, it was decided to push the Röntgen-ray treatment as rapidly as possible.

July 6, fourth exposure, forty minutes. Some relief, but a slight toxemia, occurring as a delirium.

July 16, fifth exposure, thirty minutes. Continued improvement, though a slight delirium still occurs. Retains urine as long as two hours at a time.

July 23, sixth exposure, twenty minutes. Improvement continues. Voids urine with very little trouble.

July 31, seventh exposure, twenty minutes. Retains urine as long as normal; only arises once or twice at night. Feels as well as he ever did. No pain at urination, and passes large stream. A marked reduction in the size of the testicles.

August 12, eighth exposure, twenty minutes. Except for a large amount of urination in the early morning, the patient feels as well as he ever did. Arises only once during the night. Rectal examination discloses a prostate somewhat larger than an egg.

August 25, ninth exposure, fifteen minutes. Patient is symptomatically well. No untoward symptoms. Rectal examination reveals a prostate only moderately enlarged. A marked atrophy of the testicles. Urine is clear and unscented. The residual urine has been reduced to 15 c.c.

While this is, of course, only a preliminary report, the amelioration of the symptoms has been so rapid that I have no doubt of a permanent result, though I shall continue the Röntgen-ray treatment

for a season longer. Thus far, there has been no unpleasant results from the rays, in spite of the long sittings; only a slight bronzing of the skin. I attribute this to the fact that a very old and well-seasoned tube was employed.

My own technique, though developed independently from that of the other operators, follows in the main that of Carabelli and Luraschi, with the exception that I use a current of 2 ampères at 110 volts instead of 1.5 ampères at 100 volts, and place my patient in a lateral or Simms position rather than on an inclined plane. The parts surrounding the perineum are protected by lead foil, though Tausard and Fleig prefer a specially constructed diaphragm. Gautier irradiates the lower abdomen also; both Moszkowicz and Schlagintweit employ a short, wide speculum, thus irradiating the prostate through the mucuous membrane of the rectum. We all prefer moderately high tubes so that the whole gland may be treated; Tausard and Fleig specify a No. 7 on the Benodist radio-chromometer, Schlagintweit a No. 7 on the Wehnelt scale. I employ an eighteen inch coil with mercury interrupter, two layers of the primary being connected in series. In very old men I would also expose the scrotum, as the good effect sometimes attending a castration can be added to that of the direct exposures, and thus hasten the cure.

It must be remembered that the mucous membrane, wherever situated, offers but a slight resistance to the Röntgen rays, and is, therefore, far more susceptible to an inflammatory condition than the skin. It is this very failure to resist malignant neoplasms that has made the Röntgen treatment of so little avail in the treatment of uterine and buccal carcinoma.[6] Hence the procedure of irradiating the prostate through a rectal speculum, as practised by Moszkowicz and Schlagintweit, is strongly to be condemned. It entirely explains the former's apparent failures. Moreover, as the lower bowel is very absorptive, the constant passage of fecal matter over an inflamed surface is attended with more or less danger of spreading an infection. Thus, in Moszkowicz's cases, it is not the Röntgen-ray treatment that was at fault, but his own technique.

It is entirely too soon to lay down any hard and fast rules as to what class of patients shall and what shall not be irradiated. Time alone can relegate the rays to their proper position. Personally, I feel (and all of the operators seem to agree with me) that better results can be obtained in hypertrophy of the first and second degrees than in cases in which there has been much sclerosis. I should not, however, decline any case. We have a new and effective treatment. It bids fair to surpass all others in the brilliancy of its results, and to cure all but the oldest and hardest prostates, which must, of course, be removed surgically.

[6] See the author's article in the AMER JOUR. MED. SCI., March, 1906.

THE TREATMENT OF PSYCHASTHENIA FROM THE STANDPOINT OF THE SOCIAL CONSCIOUSNESS.[1]

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The treatment of the various psychoneuroses is often attended with great difficulty and, even when we feel that we have aided to bring about results of real value, we frequently have a sense that more might have been accomplished. We are amply provided with means for acting on the bodily nutrition and for securing certain sorts of mental influences. It cannot, however, be said that our therapeutics thoroughly reflects all that we even now know of the complex organization of the human consciousness, its capacity for effective coöperation, and the dangers by which it is threatened.

One of the most striking facts with regard to the conscious life of any human being is that it is interwoven with the lives of others. It is in each man's social relations that his own mental history is mainly written, and it is in his social relations likewise that the causes of the disorders that threaten his happiness and his effectiveness and the means for securing his recovery are to be mainly sought. This principle is well established, but its bearings are not sufficiently recognized, and the purpose of this communication is to emphasize certain aspects of the subject which have seemed to me important.

The more closely we scrutinize our social bonds, the more widespread and deeply rooted they appear.[2] We cannot enumerate these bonds, but we must believe that every one of them, amalgamating itself with all the rest and thus modifying itself and them, helps to organize that vast system of interacting forces which constitutes our social consciousness. The child escapes from the necessity of protection by the parent only to associate himself with his comrades and then to become the centre of a new community. We toil for others and measure our successes and failures by their opinions and approval, or by a personal judgment which gets its color from a half-felt judgment of our neighbors. Our fears are intensified by a sense of what a mishap to us would mean to other men, or how our failure would cause us to appear in their eyes. Many habits and customs that seem to be independent of social influences at their origin become strongly modified by them as time goes on. We take our food ostensibly to satisfy physiological needs, but were it not for social considerations we should perhaps still be

[1] This essay represents an expanded portion of a paper read in abstract at the meeting of the Association of American Physicians, Washington, D. C., May 7, 8, and 9, 1907. Several other topics which were touched upon in the same paper will be taken up in subsequent communications.

[2] Many of these relationships and their modifications in disease have been admirably discussed by Professor Josiah Royce. See especially Certain Anomalies of Self-consciousness, in his Studies in Good and Evil.

bolting our meals like dogs. The great instinct of confidence (of which credit in business is one form) that furnishes us with a species of short cut of marvellous usefulness, like the calculus in mathematics, is claimed by Claparède[3] to be of biological origin, an acquisition through fortunate but accidental variation occurring in the course of evolution; but, be this as it may, it is as a social force that it gains its chief importance. The sense of terror and helplessness that attends even a hint that loss of confidence is impending is the strongest warrant for its value.

The closeness of the bonds that link together the members of a community, looked upon as separate units, is illustrated and reflected in the mental constitution of every individual. The inspiring preacher and his audience, the impressive doctor and his patient, the husband and the wife, the parent and the child, each member of a pair of friends, stand toward each other in relationships not only as of subject and object (of affection, etc.), or of two beams converging on a common focus, but of still closer and more subtle sorts.

What is an individual?[4] Is he limited by his skin? Is he constituted by some assumed "sensorium" occupied by his consciousness alone? Is he only as large as his brain and nerves? Or, on the other hand, is he coextensive with the scope of his conscious interests and affections, and thus to be considered as complete *in himself* only when his relations to others are taken into account?

The latter is obviously the only tenable view. Our bodies are not more "ourselves" than the clothes we wear, the cane with which we strike off the heads of the flowers on the roadside, the rooms in which we live, except just in so far as they are more habitually the objects of our (subconscious) perceptions and our thoughts. No one is especially anxious to claim personal significance for the hair and nails which he cuts off and throws away as belonging rather to the physical world outside than to himself.

As it is with our bodies, so is it with our thoughts. There is no possible means of describing consciousness, the mental life, but in terms partly of its contents and partly of the conditions under which it habitually works. Just as the actual presence of a friend, his facial expressions, the signs of his emotions, may become such essential parts of a man's environment that in other surroundings he is a different person, so his imagined or remembered presence acts. A thought struck out by two minds acting in conjunction belongs afterward to both, just as the flight of a ball struck by a bat points back alike to thrower and to batter. This principle is of importance as emphasizing the intricacy of the relationship between the community and its members and as indicating the responsibility which attaches to relationships allowed consciously to grow up between each man and his habitual associates. It is not a matter of indifference whether the physician represents, in relation to his

[3] Jour. Abnor. Psych., vol. i, No. 2, and elsewhere.

[4] See, especially, Nettleship, Letters and Essays.

patient, a form of community consciousness or of world consciousness of the best or of a less good sort. The fanciful story of Trilby, able to command her voice and memory only when hypnotized by her temporary master, indicates in caricature the influence of every strong personality, present or remembered, even subconsciously remembered, and this influence may be of a favorable or an unfavorable kind.

The social consciousness of a child is formed largely by imitation, imitation of others and of himself. With the acquisition of language, however, and the consequently increased capacity for comparison of mental conceptions which make possible the rise of self-consciousness, the social consciousness takes on a wholly new development. The term self-consciousness suggests but imperfectly the change which the mental life at this period undergoes. To become self-conscious signifies indeed to become aware of the meaning of one's own acts and one's own thoughts, to recognize one's self as a moral agent, to eat of the tree of the knowledge of good and evil, to leave the garden of Eden for a land of greater possibility of conscious development. But this means also learning to look upon one's self through the eyes of many others, and, as an inevitable accompaniment and corollary of this great change, becoming in a truer and more conscious sense a social being. Thenceforward one cannot live, enjoy, or suffer alone, but must share one's lot with one's fellows, bear their burdens, rejoice with their successes, and learn to endure their actual and assumed reproaches.

With the coming of self-consciousness there come also the mental disorders of social origin, due primarily to a failure to grasp the full meaning of one's social environment, its dangers, and its possibilities, and then to the adoption of morbid sentiments, habits, and traditions based on these misconceptions. The "self-conscious" person, in a morbid sense,[5] is one who has a vague sense of himself as a person surrounded by an imagined circle of critics, enemies, or admirers, toward whom he must adopt an attitude of secrecy, shame, hostility, or superiority. His diverse mental states may even become personified in his own eyes so as to reproduce the community in miniature. He then sets himself against himself, and following a natural but morbid social instinct he lends himself to the development of an inward drama in which his varying moods, like well-trained actors, play sharply defined parts, one of which is likely to be that of the villain of the stage.[6] Thus occur

[5] Royce, loc. cit.

[6] See Edward S. Martin's well-known lines [Sly Ballads in Harvard China].

"Within my earthly temple there's a crowd;
There's one of us that's humble, one that's proud;
There's one that's broken-hearted at his sins,
And one that unrepentant sits and grins;
There's one that loves his neighbor as himself
And one that cares for naught but fame and pelf.
From much corroding care should I be free
If once I could determine which is me."

certain diseases due to mental dissociation in the self-conscious sphere. So, too, the depressed person intensifies his own sufferings by playing for an imaginary audience the rôle of one whose causes for suffering are greater than his own. The cure consists in showing up the real nature of the imaginary drama, proving it to be as much a comedy as a tragedy, and substituting for it the drama of real life, with its aims and incidents and motives interpreted afresh with the aid of a broader vision.

Of course much of this process, like much of the whole process of development of the social consciousness, takes place "subconsciously," but it is none the less the patient's own waking consciousness that in the end must stand the loss or gain, according as the result comes out. The significance of this subconscious reasoning has often seemed to me well illustrated by the results of the nervous shock which so often follows railway accidents of slight amount. One is forced to conclude that the word, the very thought "accident" often precipitates, in the form of an emotion of intense fear, a mass of vague memories and traditions of which the patient could have given consciously no account, and many of the elements of this fear point to misconceived social relationships. The victim exaggerates, in his panic, his isolation in misfortune, his need of pity and of consideration, and the criminality of those to whose negligence he attributes his mishap, while at the same time his own sufferings are intensified by the sight of the sufferings of his companions in distress or through the thought of the immunity of those who had escaped.

I have indicated roughly the passage of the relatively simple consciousness of the young child into the completer self-consciousness of the adult,[7] and have hinted at the mode of origin of some of the disorders which follow in the train of this great change, of this acquisition of that marvellous power of insight into the lives of other men which so often leaves its possessor a confused and dazed spectator of his own life. To avoid this confusion means to become possessed of a well-balanced nervous organization, a unified system of mental functions, which has a greater or a less value according to the breadth of its foundations and the firmness of its structure. To fall into the confusion means to waver between a better type of consciousness and an inferior one, with the danger that the latter will often dominate the former, just as a baser currency drives out one of a nobler sort with which it is in competition.

Fortunately this cannot occur without the victim becoming dimly aware of what is going on, and aware, too, although perhaps but vaguely, of the better state which he sacrifices for the less good. The wilfully selfish or misanthropic person is in some degree alive to the value of the better social conditions which he affects to

[7] Animals and infants doubtless have rudiments of self-consciousness.

disregard. This same principle applies to the case of the psychasthenic patients. They estimate their sufferings in part by a more or less definitely recognized contrast with a more normal state which in reality they approve and for which they half-unconsciously long, and this fact is a warrant of hopefulness for their recovery, provided they are willing to be led toward a fuller realization of their ideals.

The sense of dependence upon others which makes a person self-conscious implies, from another point of view, an interest in others which only needs to be developed in order to be a source of happiness and strength instead of a source of mischief and disorder. It is impossible to draw a sharp line of division between the unfortunate characteristics which in some persons are gladly excused as the faults of their good qualities and the traits which stamp their possessors with the name of morbid. Thus, much is forgiven to the excesses of "individualism," even though it leads to a defiance of the just claims of others, and to a weakening of the sense of loyalty to common needs, because it is recognized as the mainspring of progress for the community as a whole. But individualism, when pushed to an extreme in another direction, readily develops into a silent or sullen sense of painful isolation, and this is called morbid, largely because it is useless.

It is justly felt that it falls within the province of education to cure people of these exaggerations of normal traits, but in fact they are often based upon deep-seated diseases of the brain which physician and patient alike struggle in vain to overcome, as Odin strove to drain the horn of wine which he found at last to be connected magically with the sea. Fortunately the reverse is also true, and I regard as of extreme importance the cases which are now and then reported to show that tenacious delusions of suspicion and persecution, such as commonly point to degeneracy and constitutional defect, may be in reality the product of narrow, barren, superstitious, savage conditions of social environment, which a broader civilization should be able to improve. Histories of this sort, for which the fierce and narrow individualism of New England country life has often furnished the materials, teach us to hesitate before making the diagnosis of fatally progressive "abiotrophic" tendencies, and encourage us to stronger therapeutic efforts.

In recalling to the memory the arguments which tend to show how dense is the web of common interests, affections, and needs which, though unseen, bind all our lives together almost as closely as the several moods of anyone of us are bound, and in indicating the significance of these relationships for the occurrence of diseases which often seem to caricature our very means of progress, I do not fail to recognize that these influences have their limits. There are other causes for disease besides the social causes and there are other avenues to recovery besides those which depend upon a strengthening and purifying of social ties. This is not urged as a substitute for

any treatment, but as a supplement to all. I recognize also the gulf that lies between the logical presentation of the case to the suffering patient and the emotional state of confidence, of actual conviction, that means his cure. Nevertheless, I think it is a distinct lack of many of the established methods of treatment that they fail to deal sufficiently with the conscious motives as means for unlocking hope and energy, and although there are many motives by which men's minds are stirred that do not point to social relationships as their cause, still the social motives are stronger than any except the religious motives, and these draw a large portion of their nourishment from the social sentiments on which they largely lean. It is not only the claims of those that stand nearest in blood which are recognized as paramount. The demands of social loyalty are a free-mason's bond that calls out the best from college student, from soldier, from citizen, and may even inspire respect and admiration for the motives of those with whose opinions we most fundamentally disagree.[8] Is there no place for high-class loyalty such as this in the reciprocal relationships of the invalid and the community? Assuredly there is. Now and then we see, besides the stoical invalids and the self-forgetting invalids, the "high-class" invalids who realize that by virtue of their illness they are in a position to fill a certain place of definite significance among their fellows, and the enthusiasm with which they are greeted shows that their attitude is appreciated. Such invalids were Pascal and Stevenson and many more whom every physician could name. What are the arguments for this attitude? What are the obstacles to its more general adoption? What are the motives which are seen to animate and give energy and courage to those who seek to hold it? These are questions which have long been before my mind and for which I have sought an answer. They may be taken up together, as a physician might imagine himself taking them up if talking with a patient suffering from obsessions, depression, and morbid fears.

Every physician knows that before he can present logical arguments to such a patient with any expectation of securing his attention and effective coöperation he must do something which will mitigate the feeling of emotional distress, illogical and vague but irresistible, by which he is beset. The inhibitory effect of this burden once relieved a little, the arguments for a more rational attitude come in properly to carry the improvement farther. This emotional distress is multiform in character, but the most fundamental part of it is often an ill-defined yet grinding sense of social isolation which gets its primary impulse partly from without but mainly from within. The invalid is keen to note the real indifference of those around him and quick to magnify its meaning and to let it intensify the feeling that he stands alone. The thoughtless ostracism by children

[8] This point has been worked out with especial care by Josiah Royce.

of playmates who are not acceptable to the leaders of the band may be the starting point of the same feeling, and proves the source of life-long and growing misery with some persons, though fortunately it gives the first impulse toward the formation of a stronger character with others. Then the invalid's own physical weakness, his inability to conform to social standards, to compete in occupations, to take part in sports and games, sometimes raises a fence out of which his active imagination builds a wall. Again, believing that he is a sufferer from a unique disease, he feels that his neighbors look on him as a species of monstrosity, as something unlike themselves and therefore to be ostracized. The invalid who fancies that he notes this sentiment in others is only too ready to justify their attitude and to adopt it as his own, thus carrying out the idea that he himself is virtually a community, one part of which may stand over against the other part and pass unfavorable judgments on its acts. It is probable that now and then this vague but oppressive sense of self-blame is accentuated by the crude and foolish doctrine that disease always does arise from "sin," or from "infraction of nature's laws," as if it were not well established that in plant life, in animal life, in conscious life, antagonism, destruction, and loss may be the means to progress, even if not the best or only means. The suppression of lower sentiments for the sake of higher, which forms the basis of all forms of mental healing, is the analogue of the suppression of the noxious bacteria in the interests of man. Progress toward a more complex form of civilization is possible only through nervous "instability," and this instability opens the way at once to sickness and to higher planes of health. We human beings should seek to reach the higher planes with as little loss as possible, but should not shun the climb on account of the danger it entails. The conception of an ideal world may include the idea of health attained, a real equilibrium,[9] but our finite task is to minimize the losses of a battle from which we do not shrink. Lessing states the facts when he says: "Wenn Gott in seiner rechten die Wahrheit und in seiner linken den ewigen, immer regen Trieb nach der Wahrheit, jedoch mit dem Zusatz, sich immer und ewig zu irren, verschlossen hielte und sagte zu mir 'Wähle,' Ich fiele ihm mit Demuth in die linke und sagte, 'Vater gieb; die reine Wahrheit ist ja doch nur für Dich allein.'"

Even when the sense of isolation is not felt explicitly and as such is not due in influences from without, it is often felt as an intangible cause of nameless dread. It forms a definite part of the deep sense of unreality and impairment of one's hold on the immediate present,

[9] It is true that we aim at an equilibrium, at the abolition of both disease and war, but it is with a knowledge that, to borrow an apt simile, we must content ourselves to spring from one cake of ice to another in seeking a shore which is infinitely distant. To see the whole value of the limited accomplisnment which lies within our limited powers, making sure that it is modelled upon the best scheme, and that, whether sick or well, we make our whole personality count in the issue, is a worthy and should be an inspiring task.

on one's natural affections and natural responsibilities, that Janet notes as the essential feature of psychasthenia. It may be an outgrowth, too, as has already been remarked, of the sense of individualism, which if rightly understood is indispensable to sound development. It is difficult, or impossible, in tracing back these fundamental feelings, as of courage and fear, confidence and suspicion, to be sure that one can decide correctly under which long shadow the antisocial sentiment of isolation first arises. The important thing is that doctor and patient alike should recognize that it springs from various causes and may be relieved in many ways. Vicious circles get established which vary with the individual, and it matters little how they are broken into, provided it be done. With one person courage or confidence shown in the conduction of his own affairs may be the first step toward his elimination from the sense of isolation. With another some more definite manifestation of personal sympathy or explanation is required, especially from the physician acting as representative of the community. In other cases it is more stimulating, instead of offering sympathy, to make it clear that the community, through many of its members, stands ready to make common cause with the patient in helping him to solve the problem that confronts him, and ready to appreciate at its full value any contribution that he may make on the basis of his special experience toward the more general problem which the occurrence of sickness and pain is always urging. This is the true conception of the case. In the eye of biology, as of ethics, in the interests of progress, and under the demands of necessity, the members of a community if relatively many are also relatively one, and the conceptions implied by "loyalty" embrace claims and obligations of the most varied sorts. It is no criticism of this doctrine to show that it becomes ridiculous when the attempt is made to apply it exclusively and universally; it has force enough within legitimate limits. In a sense to be interpreted with discretion, but ever more generously and more reasonably, we are all members of a social "team," and the difficulties that beset the individual invalid are difficulties for us all. The invalid has just claims on the community, not only as a needy member, but because, if he plays his part aright, he may help to work out a problem that might at any moment become of personal importance to some other individual. The community has a reciprocal claim upon the invalid member, just as an army has a claim upon the individual soldier to whom an arduous task has been assigned. It is not a help to the invalid for those who count themselves as well to shrink and shudder at his fate or to offer him the sort of sympathy which this feeling prompts. It is a help to take him, as many invalids are ready to take themselves, as a person with a special destiny, a special part to play. I do not advocate the adoption of this attitude on the part of the community as a part of the theory that everything that is is right, or even that

every evil leads necessarily to good, or that every misfortune is somehow compensated by good fortune. Of course, these opinions count, for those who hold them, as watchwords of immense power. I am here advocating, however, only a human working scheme which, if followed cordially and enthusiastically by sick and well alike, is likely to bring more benefits to more persons than any other scheme, even if not the wished-for benefit to each and every given person. "Sympathy" implies apartness and a gift; coöperation implies acceptance of the conditions of living, and of personal illness, if need be, as a part of them. It would be absurd to preach loyalty to such a scheme on the part of persons condemned to bear for a time the brunt of the contest were it not that there are so many who do show such loyalty, both in their theories of living and in their lives. Mrs. Sophia P. Shaler, in her *Masters of Fate*, records the histories of many eminent literary men of whom this was true, and everyone has seen striking instances, especially perhaps among the blind, not only the congenitally blind but those who have lost their eyesight in adult life. I have one such person in my mind who not only instinctively and systematically refrained from complaining of his loss but continued to refer to the assumed beauty of the landscape and the passage of the seasons, as if fully alive to all the pleasures of the visual sense, and another whose blindness has made her an enthusiastic worker for the welfare of the blind. There are many persons also who, like the sister of Ralph Waldo Emerson, have so cultivated their power of living in the pleasures of others that they could sincerely assert that they regarded it as their best gift. The glowing courage and optimism of men like Robert Louis Stevenson actually fills the veins of all that come in contact with them, to the extent that it is made their own by appreciation, by imitation, and then by use.

It is true that these familiar instances of courage are often expressions rather of individual character than of devotion to a common cause, and also that the persons among whom they usually occur are not sufferers from depressions, obsessions, and morbid fears, terrible to feel and sapping the very life of one's energy, yet impossible to describe or to defend even when they seem to strangle one's very breath. Fortunately, however, there are many persons who through mustering all their resources have won successfully through these states and can point to the attitude here advocated as contributing to their success.

From such patients the physician learns lessons that his text-books cannot teach, and this for the reason, among others, that the text-book in order to describe must dissect and analyze, whereas the living example is the total expression of many forces, just as one curve, itself simple, may be the resultant of many curves.

I am not now dealing with the whole subject of treatment or I should of course feel bound to speak of the conscious mental life and its disorders as to a definite extent a product of the subconscious

mental life and of the physical life and to be reached through them, and also of the fact that many seemingly unendurable symptoms are best managed by looking on them as relatively superficial, as mental tricks, or habit "tics," to be met by skill and knack and guile rather than by force or argument. But as needs and temperaments vary so must modes of treatment, and there are many patients for whom the appeal to the highly developed social consciousness is an appeal of real power. Such persons feel that the problem before them is not solely to get well but also to realize that, sick or well, they are under obligations to show fidelity to leading motives which if generally adopted would develop, first opinions, then sentiments, and then traditions such as would make societies into stronger units. Traditions of this sort are said to animate the Japanese soldier and to have animated the citizens of the Greek republic. The invalid should recognize that he is in the position to make some practical contribution toward the problem which confronted Job, and that this is a worthy object of ambition. Everyone has reservoirs of energy, large or small, that will refill themselves the faster for being intelligently tapped. The stirring address recently published by Dr. William James[10] is a forcible argument for this view. Even a small increase in the sense of power derived from systematized and graduated efforts and a small increase in the sense of fellowship which comes with the knowledge that one is coöperating with others for a definite common end may effect a revolution in the life of the neuropathic invalid.

The problem of illness is more or less like that of "failure." Both make demands upon our intelligence and our faith, and both may properly be regarded like the loss of a battle in a campaign which we expect to be successful in the end; if not successful in the sense of bringing victory then perhaps successful in the sense of having been the best that we could do, and if not that even, then at least of value as affording a contrast with an imagined more successful future effort of ourselves or others. It is difficult to take this attitude, and especially so when the illness is one for which we feel ourselves responsible. It is hard to live contentedly in company with the memory of one's failures especially if traceable to one's faults, but it is absolutely essential that one should learn to do so, and very often the first step toward the relief of the torturing distress of psychasthenic symptoms is to make up one's mind to accept them as necessary companions while at the same time learning to turn as deaf an ear as may be to their words.

For the sake of doing this successfully one may frankly accept and even accentuate the "dissociation" or community conception of the individual. If a man's habits are so strongly fixed that a portion

[10] The Energies of Men, Philosophical Review, January, 1907; Science, March, 1907; American Magazine, November, 1907.

of his mind must be morbid and antisocial or too exclusively occupied with past issues, let it be so and let him be willing to live in company with this portion but only on the condition that he shall not admit it to be his principal self. Each person has the right to decide, and must decide, which of his tendencies he will emphasize and will live by and in. He can do this and can enjoy and reason in despite of the presence of the Siamese twin of his painful obsessions, and forced and distressing thoughts and feelings. This habit of keeping a corner of the mind free from contamination and able to contemplate, as if objectively, the perturbations of the remainder, I have found extremely useful to enjoin. Everyone does this in a measure, but to do it thoroughly and systematically is another matter; yet it is a reasonable ideal aim. Multitudes of people have learned even to make a somewhat scientific study of their troubles, as the artist-poet, William Blake, who took his painful visions as models for his remarkable drawings. Thus a double end is served, knowledge is gained, and one's sense of emotional distress relieved.

An important condition of success in this attempt lies in the recognition of the fact that an illness is less likely to prove a pure misfortune if the patient holds himself ready to issue from the experience with his personal characteristics changed in various respects. He may have to adapt himself to limitations imposed by impaired capacity in some direction (as, conspicuously, in the case of blindness); he may have received a glimpse into some new mental realm or a hint as to some new possibilities in the social order. But whatever it may be, if he is willing to accept the conditions that are offered in the same spirit that he had accepted the best of those to which he had been previously become accustomed, he may find himself unexpectedly rewarded. Some persons do not need this counsel, and feel themselves under a sort of bond to obey the orders of a new set of obligations and possibilities, not only without complaint but even with a perennial cheerfulness, just as an army officer obeys without serious repining the order to change his post of service. It is this spirit that makes the process of growing old often a highly cheerful and interesting one. The leading idea or leading sentiment of one's conscious life may remain the same throughout, and thus the best qualities of youth be retained indefinitely, though the mode in which this leading idea is served may radically change. Dr. William James, in his *Varieties of Religious Experience*, gives some striking instances of the alteration in personal tastes and habits that accompany religious conversion; sometimes the changes that nervous invalidism induces are equally impressive.

The point which I make may appear of slight account, but it is not so. Many persons have a sort of cramp-like dread of any change. They feel as if their individual tastes and pleasures and the particular environmental conditions in which they had grown up formed a sort of sacred edifice which would crumble to its foundations if any

part of it were touched. This feeling may be based on habit or on a narrow, selfish view of one's position, a pure desire to retain the personal pleasures which had grown to fill too large a place in one's horizon, or it may rest on an intense affection for the persons by whom one is immediately surrounded, and who stand as symbols of one's own sacrifice and struggle. To be expected to undergo any considerable change, like that of persons who "experience conversion," sometimes seems like being asked to separate one's self in a measure from these companions. Is it, then, likely that the adoption of more broadly social attitudes, entailing the conception of one's self as a member of a larger circle, will diminish the intensity of the closer bond? Perhaps this is for some persons a real danger (although one to be met by obvious means) but the opposite result, namely, the strengthening of personal ties, ought to be the usual outcome. A common reason for this dread of change, at least on the part of persons afflicted with obsessions and morbid fears, is that they have so often suffered from embarrassing situations that they withdrew from the shadow of them with an instinctive horror. They fear novelty above all things and shrink from "getting well" at the cost of "getting different," because it may mean getting worse. Yet it is just these persons who preëminently need all the encouragement and confidence that the habit of boldly facing new conditions, small and great, can bring, and the game of learning the lesson how to do it is well worth the candle.

Like all the pieces of self-discipline here suggested, this is to be studied like any game of skill, namely, first under the influence of the well-grounded sentiment and conviction that the end is a desirable one and the means well planned; next, with a confidence stimulated by imitation; finally—and most important of all—under the constant binding of the new self by as strong and rich ties of association as possible to a new or wider circle of interests, or the old circle conceived in a new light; in other words, by the development of the social consciousness.

The wise person deliberately accepts the conditions which the game imposes on him as the basis for new efforts, learns to live within his resources, endures what he cannot help with a philosophy better than the Stoical, and cultivates the feeling and belief that whether he gains or loses thereby he will throw in his lot with that of his community. It must be admitted that no definite recompense is offered for the sacrifices which this decision may involve. The promptings of one's social consciousness must be followed without too much forecasting of the result or the reward. They cannot be forecast, and fortunately the most deeply instinctive impulses to spontaneous action are to a great extent independent of estimates as to the results of action. They are expressive rather of the constitution of one's personality. Emerson's essay on Self-reliance contains a fine sentence bearing on this point: "When good is near

you, when you have life in yourself, it is not by any known or accustomed way; you shall not discern the footprints of any other; you shall not see the face of man;—the way, the thought, the good, shall be wholly strange and new. It shall exclude example and experience," etc.[11]

Among these strong instincts those which have reference to the social consciousness are certainly prominent, and it now remains to indicate certain therapeutic experiments in which these feelings have been drawn upon.

It is a noteworthy and refreshing sign that in the best sanatoriums of the present day treatment by occupation to be followed by a number of patients working in company or on similar lines is counted as of so much value. Perhaps the first important step in this direction was taken by Grohmann, of Zurich, an engineer by training, an educator and enthusiast by nature. His work was warmly endorsed by Moebius, of Leipzig, and he has had many imitators. One of the most successful of these is our colleague, Dr. H. J. Hall, of Marblehead,[12] under whose leadership a notable training-school for workers in arts and crafts has been established, the pupils being mainly neurasthenic invalids, many of whom have been led to sidetrack their troubles, drawn along by new zeal for new accomplishment. The wholesome, natural relationships which such schemes as this make possible, at first between the co-workers themselves, then between the invalids as producers and a widening circle of those interested in the products for their own sake, must constitute an element of great value in the treatment.

Another medical enterprize which secures social relationships of a special and useful sort, incidentally to other aims, is in operation at the Massachusetts General Hospital, where groups of out-patients (thus far mainly patients suffering from tuberculosis) are encouraged to meet regularly, under strict supervision, to compare notes as to their success in carrying out modes of treatment that had been prescribed for them, and to gain interest, information, and enthusiasm for new efforts. I did not at first believe that a coöperative movement of this sort would be available for the neuropathic and psychasthenic patients, but I have changed my mind. Among those who are engaged in carrying on the experiment there are several who

[11] Compare also Schiller's poem, of which the concluding lines are here given, in which he describes the traveller gazing at the land of promise from the bank of the river which he sees no way to cross:

"'Einen Nachen seh Ich schwanken
Aber, ach, der Fahrmann fehlt,
'Frisch hinein, und ohne Wanken,
Denn die Segeln sind beseelt.
Du musst glauben, du musst wagen,
Denn die Götter leihn kein Pfand;
Nur ein Wunder kann dich tragen
In das schöne Wunderland.' "

[12] Boston Med. and Surg. Jour., 1905, clii, 29

have been through the purgatory of nervous invalidism or are still wandering in its circles, and their experiences give them in some respects a peculiar fitness for the task.

The case of one of the co-workers in this enterprize has especially interested me because the person in question had been a thorough and critical student of philosophy yet had not found that his studies had yielded him any considerable practical aid as regards the problems of his daily life. No scheme had seemed reliable as a universal guide. He became psychasthenic and passed through a long period of invalidism—not under my care—which he had found it difficult to shake off. Under persistent urging he returned to his studies and recovered, and at last admitted that he had gained a new point of view and one which led him to devote a portion of his time to this practical work.

In a general way the object of this undertaking is the establishing of closer social relations with those who attend the hospital off and on for out-patient treatment than would be possible if the busy doctor and the embarrassed patient were alone concerned. For this purpose a paid agent, or a helper acting under her, visits selected patients in their homes, endeavoring to make sure that the advice given by the physician counts at its full value, to get nearer to the home life of the invalid, and to help toward improvements in conditions discovered to be faulty.

This movement in behalf of neuropathic patients is a recent outgrowth of that which had been in operation for several years under the leadership of Dr. R. C. Cabot.

It is less easy to utilize this principle of coöperation in the interest of a single patient than in those of a group, but observations like that recently recorded by Dr. Sydney Schwab, of St. Louis,[13] shows that it can be done. The case was that of a lady of middle age, highly neurasthenic and neuropathic, but with good literary gifts, for whom Dr. Schwab succeeded in creating a small circle of understanding and congenial friends by whom she was led into pleasant professional relations with a larger circle and thus into more wholesome relations with herself as reflecting the life and needs of many others.

It is a striking fact that side by side with this sort of treatment, which seems so humanizing in its tendencies for the neuropathic patient suffering, wittingly or unwittingly, from social isolation, another method should have arisen, which makes equal claims for success, yet appears to be founded on an obverse principle. This is the method by isolation, well-known to all neurologists since the day it was so well described by its great advocate, S. Weir Mitchell, and since then brought forward from time to time with new modifications in detail, as recently by Déjérine and his followers. Of

[13] Jour. of Nerv. and Ment. Dis., August, 1907.

course the real fact is that the isolation, like the daily hour of meditation of the tranquil Hindoo, is only suited for a brief period, and careful readers of Dr. Mitchell will recall that he did not consider his labors ended until he had enjoined upon his patients a life adapted to their powers of active usefulness.

These two modes of treatment are then really not so very different from one another. Nevertheless I believe that the latter portion of Dr. Mitchell's teaching is followed with less care than the other portions. This should not be the case. Even the treatment by occupation, by side-tracking of distressing symptoms, makes conscious coöperation with others a matter of secondary importance, and in this respect is open to improvement. Side-tracking and even recovery are not the only issues at stake. Much pains may well be taken to make the patient feel his social obligations at their full value.

If these principles are important for the adult invalid, as a means to his recovery, they are doubly so for children, if only as a means of guarding them against some of the causes of the nervous breakdown in adolescence and adult life.

Finally, I wish to refer briefly and for special reasons to a few private observations of my own.

I have especially in mind the case, which may stand as typical of a group, of a lady of intense and ardent temperament but delicate physical health, who passed in early life through several exciting, emotional experiences, one of which in particular was of a sort to make a deep and painful impression on her mind. She was always inclined to introspection as well as to really profound inquiries into questions of religion and philosophy. Being very high-minded, and at the same time sensitive and impressionable, and being under the necessity as well as the desire of working at the limit of her strength, she became a teacher, and gained success and credit. Finally she broke down, perhaps more under the stress of hereditary weakness than that of outward pressure, and became melancholic, with, at one time, a marked tendency to suicide. She was placed in a hospital for the insane for a long period, and since then has had a number of recurrences of her illness, from one of which she is now suffering.

The special reason for which I report the case is that this lady, like John Bunyan whose inward struggles were in some respects analogous to hers, and like a number of other persons whose histories I have in mind, gradually gained a surprising amount of control over her emotions and her thoughts, so that she often exhibits for long periods at a time an amount of stability which few physicians who knew her at the earlier period would have thought possible. Not only this, but in the course of the many long conversations which I have had with her she has been able to assure me that she feels no regret for the experiences through which she has passed, not even for the painful event before alluded to, which might have been counted greatly to her discredit in a social sense. In other words,

she seems to me to have exemplified the possibilities of an outcome of illness and trial which, in my opinion, should be regarded as in the best sense its only proper outcome. The fact that her disease is at times too strong for her should not count as equivalent to failure. The limitations imposed by sickness were for this patient a means of securing results which otherwise they scarcely could have reached, and this is not uncommon. The person who recovers after a long period of nervous invalidism is apt to recover with temperament and character of a new sort. It is often fortunate that this is so; and it is the voluntary resistence on the part of the patient to any change, it is his insistence on considering the restoration to his former self as the only condition upon which he will count himself as well, that often chiefly works to make an even relative cure impossible.

The lady whose story I have briefly sketched[14] is always associated in my mind with another whose experiences were much the same, both as to inward struggles in the past and as to eventual emergence with individuality and character of increased strength and poise, while both have continued to devote their time and talents to the public welfare. It happened that I asked both of them to what influences they mainly attributed their relative recovery, and both promptly answered, "To philosophy and religion." The answer carried a meaning in both cases that the words would not necessarily convey. Many persons speak of philosophy and religion for whom both influences have an uncertain meaning. Their philosophy may be crude and their religion is quite likely to be conventional and exclusive. With these patients, however, the benefits referred to philosophy were based on a very thorough study of that science, while the religious convictions of both, while deeply seated, were eminently free from narrowness or superstition. These patients were eminently persons with whom the *general principle*, the mental attitude, the point of view, counted as agencies of great power. One often sees patients who get well after protracted periods of nervous invalidism, but only through the intervention of some *individual*, layman or physician, whose personal influence, masterful or persuasive, as the case might be, strongly tended to make the outcome possible. This is all right if the individual in question is constantly engaged in the effort to make himself eventually unnecessary, but it is peculiarly edifying to see patients who reach an effective guiding principle largely by their own efforts and through the value of the ideas by which they have been led. Physicians might be the repositories of these ideas oftener than they are.

The mention of the two patients to whom I have alluded leads me to make some further reference to the matter of religious influence, which with them counted for so much. Physicians are under pecu-

[14] Both these patients had social consciousnesses of a high order and were continuously devoted to the social welfare.

liar obligations, as it seems to me, in view of the immense and varied influence that the religious sentiments exert, to fit themselves for studying the religious consciousness from several points of view. Whatever else these sentiments may stand for in a given case, they stand theoretically for the social consciousness in its most highly developed and universal form, and therefore are of prime importance.

Physicians are bound to keep themselves ready to understand the points of view even of those with whom they are not in intellectual sympathy. Not only this, but they are bound also to analyze and to estimate, as students of science in the largest sense, the relative value of the different motives and emotions to which the religious sentiment gives rise. Finally, physicians should not be led through their loyalty to natural science to feel that there is no other scientific mode in which the truth can be expressed. Philosophy and metaphysics likewise have their claims.

The best measure of social progress is to be found in an analysis of the relationship that obtains between the individual and the community, and this is as true with regard to questions of invalidism as with regard to questions of political progress or questions of labor and the distribution of wealth.

We rejoice to see the invalid bear his troubles with courage and in silence, as if they were of significance to him alone, but it is more edifying, and a sign of a better civilization, to see him sustained in bearing them and in attempting to overcome them, by the feeling that in so doing he is working, as an individual, to be sure, and in that sense alone, but with and for the community, in the largest sense. It is important that the physician should find means of making his patients feel, as far as practicable, that they can coöperate, in spirit if not in flesh, in making such an outcome possible. If nothing more, they can create a background of sympathy.[15] It is not all the elements of a chord of music that are separately distinguishable to the ear,

> "Nor knowest thou what argument
> Thy life to thy neighbor's creed has lent."

It has been questioned whether the sentiment of loyalty is as effective an influence as it should be, in our community and in this day of somewhat misunderstood individualism. If this is so there is the more reason for accentuating the importance of coöperative social efforts in the therapeutics of nervous invalidism. Then such arguemnts as that expressed in the well-known lines of Arthur

[15] "A shipwrecked sailor buried on this coast
Bids you set sail.
Full many a gallant bark,
When we were lost,
Weathered the gale."
(Greek Anthology.)

Clough may come to be widely accepted as standing for an appeal of real cogency:

"Say not, the struggle not availeth,
The labor and the wounds are vain,
The enemy faints not, nor faileth,
And as things have been they remain.

"If hopes were dupes, fears may be liars;
It may be, in yon smoke concealed,
Your comrades chase e'en now the fliers,
And, but for you, possess the field."

THE CURABILITY OF A RARE FORM OF NOCTURNAL PETIT MAL BY THE USE OF LARGE DOSES OF BROMIDE.

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Rapidly recurring nocturnal petit mal is a rare form of sleep epilepsy which occurs both independent of, and in connection with, grand mal seizures. The general exhibition of the type is the same whether associated with grand mal or not. Herpin called this type "intractable" epilepsy—epilepsy defying all medication. No author has made extended comment on the condition. Bromides, as ordinarily administered, invariably increase the attacks. This fact has caused many observers to diagnosticate the state as a form of hysteria, a disorder of sleep, such as pavor nocturnus, somnambolism, and the like. I have seen but 4 cases of this type of epilepsy among several thousand cases. Aside from the peculiarity of the attack, the epilepsy in which the seizure occurs does not differ in causation or course from idiopathic grand mal. However, its termination under specific treatment is quite different. As is well known, grand mal epilepsy is usually infrequent in cases that show bizarre or fragmentary attacks.

The attacks of nocturnal petit mal invariably occur while the patient sleeps, either by day or night. Usually, as soon as the patient falls asleep the attacks begin. There may be as many as three hundred separate and distinct attacks in a single night. The patients usually awaken from deep sleep, the eyes are opened widely; the pupils are dilated and irresponsive to light, the head is moved from side to side. There is an anxious and furtive look in the face. The face may be congested or very pale, and is usually the one or the other to an extreme degree. In a few seconds after the onset the patient executes some incredibly rapid movements of the hands or

feet, but with no clear intent or purpose, such as is seen in somnambulistic states. For instance, the patient drums on the bed, executes kicks aimlessly in space, beats his head, thigh, or chest in a senseless way. He may spring in the air or turn somersaults rapidly. Sometimes patients exhibit attention when spoken to, but they make no coherent reply. Unless disturbed, the patient soon passes into normal sleep at the end of the attack.

CASE I.—My first patient had two hundred similar attacks during the night. I made the following note: The patient suffered a mild attack at 9.20 A.M. (He had retired at 8.30 A.M., and was sleeping by day.) The patient was rather restless in his sleep; occasionally he opened and closed the hand and twitched the feet. At the onset of the attack he opened his eyes in a wild, frightened manner and lay quietly for about five seconds; the pupils dilated widely, and upon application of the light test the patient was startled and closed the eyes several times, but the pupils remained irresponsive to light. He then sat up in bed, clutching the mattress. He flexed and extended the legs rapidly. The lips were drawn back from the teeth, and the teeth were tightly closed in a demoniacal grin; he slowly turned his head from side to side several times. With three jumps or hitches he then moved down the mattress while in a sitting posture. He gripped the mattress again, and moved quickly backward to the head of the bed in the same sort of manner as he had moved down from the head. He repeated this entire movement three times. The patient then sat still for five seconds, but with the facial expression unchanged. The attack then ended in perfect and instantaneous consciousness. The pupils readily responded to light. The whole phenomenon had lasted but thirty seconds. Five minutes prior to the attack his pulse and respiration were normal, but during the attack his respiration was rapid and very heavy, almost stertorous; and one minute after the attack his pulse was 94 and respiration 22. The face, which was highly congested during the attack, remained somewhat flushed after the seizures.

The patient had but two typical grand mal epileptic attacks in as many years. Bromides in ordinary dosage (60 to 120 grains daily) were not only ineffectual in controlling the attacks, but actually increased the number of paroxysms threefold over that of the non-sedation period. The case had been repeatedly diagnosticated as a form of grand mal hysteria associated with grand mal epilepsy; but by placing the patient under close observation the so-called hysteric attacks were proved epileptic in character and of the paroxysmal waking type, a form of rapidly recurring petit mal. The patient was finally given bromides in high dosage. The attacks increased in severity and frequency while taking the bromides from 30 to 130 grains daily, but on a daily dosage of 130 to 230 grains the seizures became less frequent and severe, and finally ceased altogether after five days' treatment at 400 grains daily. The high-

dosage experiments finally showed the sedative level was 230 grains, at which amount medication was sustained for several months. The patient had no more awakenings nor any other epileptic manifestation whatever, and he is now in excellent physical and mental health, which is in marked contrast to his former hopeless state.

CASE II.—My second patient had attacks nearly similar to those just described for Case I, but he never presented any form of grand epilepsy. The rapidly-recurrent petit mal constituted the only form of epileptic attack. This case, as that of Case I, had been persistently diagnosticated as hysteroepilepsy. This diagnosis was believed to be correct because of the character of the attack and the failure of bromide treatment to reduce the condition. Bromide had never been given above 60 grains daily. After close observation for several weeks, the epileptic nature of the seizures was disclosed by the unconsciousness, pupil test, etc., which diagnosis was confirmed by bromide treatment in high dosage. The awakenings ceased entirely, but, as is usual in such cases, the number of attacks increased in frequency while under smaller doses of the drug. The necessary dose to suppress entirely the nocturnal petit mal in Case II was 230 grains; later, the bromide sedation level was found by experiments to be 160 grains. The patient has now had no seizures nor any epileptic manifestations whatever for more than two years. There has been marked mental and bodily improvement.

CASE III.—The third case was that of an idiopathic epileptic who had but two grand mal seizures in eight years. She had been classed as a hystero-epileptic, and because of such diagnosis she was without proper bromide treatment for years. A sample of her attacks is as follows: At 1.30 A.M. the patient awakened suddenly, rolled out of bed, throwing her arms, head, body, and limbs about violently, inflicting bruises, principally on the face, legs, and feet. The eyes were widely opened; the mouth opened and closed forcibly, expelling air from the lungs at each opening of the mouth; the hands grasped anything within reach; there was a marked pallor of the countenance. There was no convulsion. The awakening lasted twenty seconds; the patient then jumped to her feet, perfectly conscious, went to bed, and composed herself to sleep. Axillary temperature immediately after was 100°, pulse 128, respiration 25. The patient denied any knowledge of what had occurred when asleep. The patient remained quietly in bed, sleeping soundly between attacks. Another attack of about the same character occurred at 5 A.M., which, however, was followed by profuse perspiration over the entire surface of the body. Temperature normal, pulse 118, respiration 24. I failed to observe any rigidity of muscles in any of the attacks. At 6 A.M. patient had a third attack. Usually the attacks occurred, from ten to twenty in number, whenever patient fell asleep, either by night or day. Under moderate bromide dosage the poroxysms increased in frequency, but under high dosage

(130 to 180 grains) the attacks ceased entirely and have not recurred. She now takes but 110 grains of b.omide daily. Bodily and mentally improvement is marked under the sedation treatment, in striking contrast to the former critical conditon.

CASE IV.—The fourth patient, a young man aged twenty-six years, had had his epilepsy since his ninth year. After the first four years of his epileptic career he began having rapidly recurrent nocturnal petit mal, having ten paroxysmal awakenings nightly. He slept fourteen hours daily, and yet "often looked and felt haggard." He lost flesh steadily, and, although over six feet in height, weighed but 113 pounds. The attacks occurred in a few minutes after falling asleep, even when he dozed in his chair during the day. He suddenly awakens, glances from side to side with an expression as though he were in search of something. The face assumes a painfully-frightened appearance. The patient then lifts himself to a half-sitting posture and either mutters a senseless jargon or expectorates violently several times, whirls himself forcibly over and over and finally, with a long-drawn sigh, falls into deep and natural sleep. During these attacks patient is unconscious, but may be easily aroused. Pupils are widely dilated and are totally irresponsive to light test. The face may or may not be congested during the attack. There is no after-remembrance of dreams upon awakening, and the patient often asks to be allowed to sleep by day, so as not to disturb his relatives. If he sleeps by day, the same phenomenon occurs as at night. Patient was cured of these attacks entirely by bromides in high dosage, 200 grains daily. After six months' absence of attacks, bromide was reduced to 140 grains daily. Until a daily dose of 185 grains of bromide was given, the patient's nocturnal petit mal increased in suddenness and frequency to a frightful degree; as many as four hundred attacks are known to have occurred nightly. Many more must have occurred unobserved. At 185 grains of bromide daily the seizures suddenly and entirely disappeared. Patient had occasional grand mal attacks during the early years of his epilepsy.

There were no stigmata of hysteria in any of the cases.

While all of these cases may relapse in time, yet an immunity from paroxysms for several years or more is a great advance over the rapid deterioration threatened.

The principle of high dosage of bromide may be stated as a form of hyperbromidism, bromide intoxication, or poisoning. The drug is given in a steadily-increasing dose, as that of iodide in specific disease. The patient has high rectal irrigation once or twice daily to reduce the amount of congestive catarrh, eliminate toxins induced by faulty metabolism or deficient oxidation, and for its diuretic effect. The patient is also given prolonged hot packs and baths at night for diaphoretic effect, and cold douches, sprays, and cold drip-sheet treatment mornings to stimulate the peripheral sensory

nerves and to preserve vasomotor tone. Vigorous deep massage is steadily maintained to cleanse the muscular circulation. The inordinate tendency to local stasis of circulation in the skin and its consequent depression of the skin function shown in acne, etc., is corrected by face packs, hot moist bran applications, and mild stimulation of ointment applied at night. Mouth and nasal cleanliness, occasional lavage of the stomach and large quantities of aërated vichy (two or three quarts daily) are absolutely necessary. Respiratory gymnastics are not forgotten. Oxygen inhalation and transfusion have not been found necessary, but might be in some cases. Incipient heart failure may be gauged by the second pulmonic sound and the degree of splitting of the second tone. The latter is easily controlled by strychnine and digitalis. It is unnecessary to say that the food is always light, highly nutritious, but not too concentrated. No meats are allowed.

In brief, it may be said that an extreme impregnation of the cortex is aimed at, while the somatic effect of the bromide is reduced to the minimum. The treatment above outlined fixes, in the nerve tissues, the greatest amount of bromide possible. One should never wait for the signs of bromide intoxication, but begin all the precautionary treatment at the start, as in the treatment of simple epilepsy. Time will thus be gained in pushing the sedation to an early and favorable climax.

These attacks of paroxysmal awakening are of timely interest, in view of the fact that the extension of the term hysteria by the French school is fast threatening to engulf many, if not all, of the disorders of sleep. There can be no doubt that the type of paroxysmal awakening, which I have briefly outlined, is a rapidly recurring petit mal form of sleep epilepsy. It may resemble forms of hysteria, somnambulism, or nightmare, to all of which it may be closely allied, but its epileptic nature is none the less certain. It is as definitely epileptic in character as classic grand mal. It is a sleep disorder in epilepsy analogous to the epileptic sudden somnolence of Semmerling, which form of epilepsy, it may be recalled, attacks the patient during waking hours.

The most practical and interesting fact regarding this form of epilepsy is its ready subjection by large doses of bromide. This point is especially urged, notwithstanding so many writers of today are vehemently urging the decrease of all bromide medication in epilepsy. Why the small doses of bromide actually increase this form of sleep epilepsy is very difficult to explain. It is possible that small doses may only lower cortical inhibition without exerting sufficient sedation on the motor centres in the cortex.

While it is highly gratifying to know that this peculiar and rare type of sleep epilepsy is most amenable to amelioration or cure by extreme bromide medication, the care and attention that such cases must necessarily receive during the medication, cannot be too thoroughly insisted upon.

THE ACTION OF THE NITRITES ON THE HEART.

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The use of the nitrites as therapeutic agents in medicine has passed through the stage of commendation, has been followed to some extent by a period of disuse, much as other remedies of importance have been forced to do before their physiological action has been placed on a sound basis by proper experimental observations. At one time this class of drugs, especially the nitrite of sodium, was extensively used in disease of the kidneys associated with high arterial tension. When used for a long time it apparently caused a reduction of the high tension seen in these cases of chronic Bright's disease. Later on the very pronounced action of amyl nitrite in lessening the arterial spasm in angina pectoris and in relieving the attacks was demonstrated by Sir Lauder Brunton. The establishment of this action served to bring the nitrites into great favor, and at the same time served to formulate a theory as to the cause of the anginal attacks. Since this time this group of drugs has been employed for the relief of a great variety of morbid conditions, which generally have had as their most marked symptom a spasm of involuntary muscle tissue, especially that of the smaller arteries.

The physiological action of the nitrites is exerted chiefly upon the bloodvessels and the blood. They produce a decided dilatation of the arterioles and smaller veins, bleeding, as it were, a person into his own vessels, and causes as a result a pronounced fall in blood pressure. The method by which this change is brought about has been proved to be due to the action of the drug on the vessel wall, and not to any influence it might exert upon the nervous mechanism of the vessel. This change in the vessels is especially marked in those of the splanchnic area and the head. This same influence is also exerted on the coronary vessels, and is a point of importance which will be referred to later.

The changes in the blood are marked, and consist chiefly in a conversion of the hemoglobin into methemoglobin and a mixture of methemoglobin and nitric-oxide hemoglobin. This change is not so pronounced in man as in some of the lower animals.

The poisonous effect of the nitrites seems to be due to their action on the hemoglobin in paralyzing the oxgyen-carrying power of the blood.[1] It is usually supposed that the nitrites, in addition to their

[1] John Haldrane, Jour. of Phys., vol. xxi, p. 189.

above stated action on the bloodvessels and blood, have a depressant effect on the heart muscle.[2] The object of this paper is to question this last part of the nitrite action and to demonstrate an increased efficiency of the heart by their use in certain cases.

The nitrites have an evanescent action in the body. The very volatile preparations, such as amyl nitrite, exert their influence rapidly and quickly pass off, while such preparations, as sodium nitrite, which are not volatile, gradually give rise to the nitrite action, and this persists for some time and gradually disappears as the drug undergoes oxidation. In the duration of its action nitroglycerin takes a place midway between these two extremes.[3] The amyl nitrite action is noticed in ten seconds after its administration and lasts about two minutes. Nitroglycerin given in doses of 1 minim of a 1 per cent. alcoholic solution reduces the pulse tension in two minutes and keeps it below normal for about two hours. Sodium nitrite given in the dose of 2 grains begins to reduce the tension in the normal pulse in from three to four minutes, and its maximum effect is seen in fifteen to twenty minutes; this effect lasts from two to three hours.

The deductions arrived at in this paper are largely due to a series of experiments on the action of nitroglycerin on the circulation of the dog. Dogs varying in weight from six to twelve kilos were used. The average dose of the drug was 0.5 to 1 c.c. of a 1 per cent. alcoholic solution of nitroglycerin injected into the femoral vein. During the experiments, a constant record of the blood pressure was taken from the carotid by a mercury manometer, and the heart's action was recorded by Matthews' modification of the Roy-Adami myocardiograph. As many old dogs as could be obtained were used in the experiments in order to determine if there existed any variation in the action of the drug on animals with young hearts and vessels and in those whose circulatory apparatus had undergone some degree of degeneration as a result of the wear and tear of living. It is interesting to note that in practically all of the old animals there was a difference in the action of the nitrites. This will be discussed later.

Experiment I.—Old dog. Weight about 10 kilos. It was difficult to anesthetize this dog with any degree of safety, both on account of failure of the respiration and the heart. Upon inspection it was seen that the heart was slow, moderately dilated, and flabby. The muscle had an anemic appearance. As seen from the tracings, the oscillations in blood pressure were very marked, resembling a good deal those produced by slight vagus stimulation. The blood pressure was 120 mm., the heart beat 60 per minute. 0.33 c.c. of a 1 per cent. alcoholic solution of nitroglycerin was injected into the femoral vein. The blood pressure

[2] Leech, Croonian Lectures. British Med. Jour., July, 1893, p. 6.

[3] Broken up in the presence of alkalies into a mixture of nitrates and nitrites.

dropped to 80 mm. and the oscillations began to approach a more normal type. In thirty seconds the blood pressure was 140 mm., and from here on the blood pressure continued to be 140 mm. The myocardiograph tracing showed in the normal a systole of 7.8 cm. and a diastole of 10.5 cm. as measured from the base line. During the rapid fall in blood pressure, as measured from the base line, the systole showed a measurement of 7 cm. and the diastole a measurement of 11 cm., thereby increasing the amplitude of the heart's beat. At the point where the blood pressure reached 140 mm. the systole showed a measurement of 5 cm. and the diastole a measure-

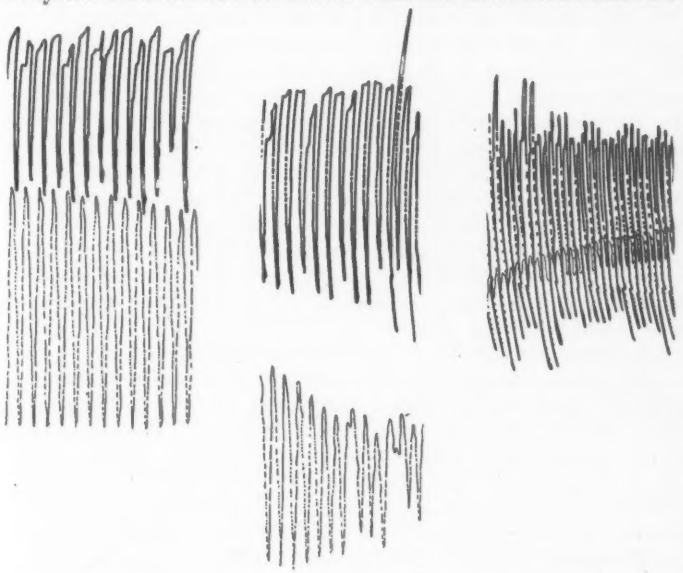

FIG. 1 FIG. 2 FIG. 3

FIG. 1.—Shows the normal blood pressure and myocardiograph tracings of the right ventricle, and the marked oscillations in blood pressure. Read from left to right.

FIG. 2.—Shows the increased systole and the blood pressure oscillations approaching a more normal type.

FIG. 3.—Shows the rise in blood pressure and the continued improvement in the systole with a decrease in the diastole.

ment of 8.5 cm. This change in the heart's contractions was brought about by a decrease in the diastole and an increase in the systole. The appearance of the heart changed from a flabby and anemic organ to one with a normal color and with forcible contractions.

This experiment shows, in the first place, a decided, but temporary, fall in blood pressure, lasting twenty seconds. At first an increase in the systole with a slight increase in diastole. Following the rise in blood pressure the systole continues to increase, but the diastole to decrease. (Figs. 1, 2, and 3.)

The decided changes produced in the efficiency of the heart's action of this animal cannot be taken as the usual effect of nitroglycerin. For some reason the changes were more marked than any of the other tracings show. The results in this experiment serve to show in an exaggerated form the influence of the nitrites on the heart. In all of the fifteen experiments the same result could be obtained, though in a less pronounced degree. This can be seen by an inspection of the table containing the data derived from the old dogs.

Experiment II.—Young dog. This animal weighed six kilos. The experiment was conducted in the same manner as that described for the old dog. As shown by the table, the systolic contraction measured from the base line was 8 cm., the diastolic 11.6, the excursion of the lever 3.6, the number of contractions in ten seconds 33, the blood pressure 100 mm. Ten seconds after the injection 0.5 c.c. of a 1 per cent. solution of nitroglycerin the heart showed a systolic contraction of 8.5 cm., a diastolic contraction of 12 cm., an excursion of the lever of 3.5 cm. The number of contractions was 30 per second, and there was a blood pressure of 40 mm. Thirty seconds after the administration of the nitrite there was a systolic contraction of 8.5 cm., a diastolic of 11 cm., and an excursion of the lever of 3.1 cm. The number of contractions was 25 per second and the blood pressure was 94 mm.

The protocols (Tables I and II) of experiments on young dogs are appended. An analysis of the protocols of the old and the young dogs will show the following differences in the action of the nitrite: First, the blood pressures, as a rule, were higher in the young than in the old animals. The nitrites produced a more marked fall in the blood pressure of the young than it did in the old dogs. Regarding the comparative effect of the drug on the heart's action, first the rate was generally increased in the old dogs, the systole was increased, the diastole diminished, and the extent of the contractions as indicated by the excursions of the lever was generally increased. The action of the drug on the heart of the young dogs showed first very little change in the rate; the systole was but slightly influenced; there took place an increase rather than a decrease in its efficiency. The diastole was also but slightly affected. The excursions of the lever showed a decrease in their extent, which, on the whole, would indicate a slight lessening in the output of the heart. This is just opposite to the results obtained in the old dogs. In both cases the tendency of the heart is toward an increased systole, which physiologically means an increased efficiency and would not indicate any depression of the heart muscle.

The differences noted between the response of the old and the young dogs to nitroglycerin are what might be predicted. In the young animal the vessel walls are perfectly elastic and the heart is working against a load perfectly adapted to the strength of the organ. The

TABLE I.—*Effect of Nitroglycerin on the Heart and Blood Pressure of Old Dogs.*

Time.	Distance of systole from base line in cms.	Distance of diastole from base line in cms.	Excursion of the writing lever.	Number of contractions in 10 seconds.	Height of blood pressure in mm.	Remarks.
1. Normal . . .	7.8	10.5	2.7	10	110	0.3 c.c. spts. glonoin.
10 seconds after injection. . .	7.0	11.0	4.0	11	7.0	
30 seconds after injection. . .	5.0	8.5	3.5	20	140	
2. Normal . . .	6.2	8.6	2.4	21	94	0.5 c.c. spts. glonoin.
10 seconds after injection. . .	6.7	8.8	2.1	29	30	
30 seconds after injection. . .	5.6	8.9	3.4	30	74	
3. Normal . . .	7.7	10.8	3.1	23	70	0.5 c.c. spts. glonoin.
10 seconds after injection. . .	7.8	11.0	3.2	25	40	
60 seconds after injection. . .	7.5	10.2	2.7	22	64	
4. Normal . . .	8.2	11.4	3.2	24	64	0.5 c.c. spts. glonoin.
10 seconds after injection. . .	8.3	11.5	3.2	30	24	
60 seconds after injection. . .	6.8	10.0	3.2	30	35	
5. Normal . . .	8.0	9.2	1.2	30	72	0.5 of 1 c.c.
10 seconds after injection. . .	6.6	9.6	3.3	38	46	
40 seconds after injection. . .	6.4	9.7	3.3	34	80	

TABLE II.—*Effect of Nitroglycerin on the Heart and Blood Pressure of Young Dogs.*

Time.	Distance of systole from base line in cms.	Distance of diastole from base line in cms.	Excursion of the writing lever.	Number of contractions in 10 seconds.	Height of blood pressure in mm.	Remarks.
6. Normal . . .	8.0	11.6	3.6	33	100	0.5 c.c. spts. glonoin.
10 seconds after injection. . .	8.5	12.0	3.5	30	40	
40 seconds after injection . .	8.5	11.6	3.1	25	94	
7. Normal . . .	8.0	11.8	3.8	30	136	0.5 c.c.
10 seconds after injection. . .	8.6	12.4	3.8	29	84	
1 minute after injection. . .	7.5	10.7	3.2	24	120	
8. Normal . . .	7.6	9.1	1.5	26	120	0.5 c.c.
10 seconds after injection . . .	8.1	9.4	1.3	30	46	
1½ minutes after injection. . .	7.3	8.4	1.1	25	100	
9. Normal . . .	4.8	7.4	2.6	28	110	0.5 c.c.
10 seconds after injection. . .	5.0	7.7	2.7	33	52	
1½ minutes after injection. . .	4.7	7.2	2.6	30	80	

nitrites entering such a system cause a relaxation of the musculature of the vessels and relieve the heart of a portion of its work. This would naturally give a fall in the blood pressure and would cause a slightly greater contraction of the heart, just as the contraction of the skeletal muscle will be greater under a minimum than under a maximum load in such cases. We should not expect the heart to undergo a marked reaction. In the first place, the heart is not working against a maximum load, it has not had to call upon its reserve, and therefore a lessening of its burden would not be followed by any great increase in its contractions.

In the old flabby heart, as shown in Experiment I, the organ was evidently working against a resistance which had called upon its reserve and was requiring too much of its energy. In this case the vessels had undergone a certain degree of sclerosis[4] so that they would not respond to the same extent by dilating as would the normal vessels. The lessening of the load that the heart was working against would show a greater degree of change, in that the heart would be placed in such a condition that it would work against a load more nearly adapted to its strength. This would be indicated by an increase in the systole and by a lessening of the diastole, which would produce an increased output of the heart. The degree of increase in the systole is greater than the decrease in the diastole. The circulation is somewhat augmented by the increased rate and force of the heart.[5] This would further mean that while the heart is working against a diminished load, its supply of nutrition remains unchanged, or if the coronary vessels undergo a dilatation as the other vessels do, it would give the organ while at rest more nutrition, all of which would tend to raise the efficiency of the heart's action.

Another point which it might be well to speak of in this connection is a certain antagonistic action the nitrites have to digitalis and to strophanthus. These drugs, especially strophanthus, greatly increase the irritability of the heart muscle, causing it to contract more forcibly and to a greater extent.[6] They cause also a contraction of the arterioles, which results in a marked rise in blood pressure. This increased irritability of the heart muscle plus the increased resistance means an increased call upon the energy of the heart which may lead to fatigue. If the heart is tending toward fatigue under the influence of these drugs, nitroglycerin will lessen the load of the heart, and this will permit the heart to work longer and more efficiently in its irritable condition than would be possible under a very high blood pressure.[7]

In the later stages of heart disease, whether due primarily to change

[4] A histological examination of the heart muscle, coronary arteries, and aorta was made to determine this supposition.

[5] A. W. Hewlett. Jour. of Med. Research, vol. xv, No. 3, p. 391.

[6] MacNider and Matthews. Amer. Jour. of Phys., October, 1907.

[7] C. R. Marshall. Jour. of Phys., vol. xxii, p. 19.

in the valves, heart muscle, or arteries, there comes a time when the heart has used up its reserve force and begins to dilate. There occurs a train of symptoms indicative of a decrease of the force behind the circulation. When such changes occur from a primary disease of the heart, they not infrequently develop gradually, while when due to kidney inefficiency resulting in a retention of some toxic material which likely causes a sudden vascular spasm, too much work is suddenly thrown upon the heart, and a rapid dilatation ensues before the organ can adapt itself to the new demand. In such cases, in order to bring about a restoration of the heart action there are two alternatives: either to lessen the amount of work the heart has to do, or, by judicious stimulation, to increase the functional activity of the organ to such an extent that it can meet the new call that has been made upon it and properly perform its function.

It is not the purpose of this paper to discuss the various remedies which may be used to bring about this restoration of the circulation. In the large number of cases of embarrassed heart action which develop more or less suddenly from acute Bright's disease and during the course of chronic Bright's disease, the nitrites should be of distinct value as therapeutic agents. Their primary and most marked effect is to dilate the smaller arteries and veins, lower the blood pressure, and remove some of the resistance offered to the overworked heart. The work of the heart is temporarily lessened. If their action stopped here, or if they depressed the already embarrassed heart muscle, their use would undoubtedly do harm. But if at the same time the work of the heart is lessened, and if the systole is increased and the diastole lessened, no harmful influence, but a beneficial one, could come from their use in such emergencies.

I wish to express my sincere thanks to Dr. S. A. Matthews, Director of the Laboratory of Experimental Therapeutics, for his aid and many helpful suggestions during the preparation of this paper.

OTITIS MEDIA AND ITS TREATMENT.

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The general practitioner is familiar to some extent with most of the so-called specialties, and feels that he is competent to care for properly patients with minor gynecological, surgical, or nose and throat affections; but diseases of the eye and ear are usually neglected by him. It is true that the field of the general practitioner is

very large, and he must draw the line somewhere as to what he will undertake if he expects to have more than a nodding acquaintance with that part of the work which he does consider within his province. In his daily life he soon finds that some special preparation and equipment along several lines is very necessary, and we find among the general practitioners competent clinical microscopists, expert physical diagnosticians, adepts in pelvic diagnosis, and so on; but how rarely one sees a general practitioner who can manipulate a head mirror so as even to direct the ray of light into an ear, much less to see and understand what he sees there. Yet it is likely that in the average practice affections of the ear of greater or less importance are quite common, much more so, for instance, than cases of appendicitis, or enlarged prostate, or diphtheria, and it must follow that just in that proportion the proper understanding of those ear conditions and the ability to recognize and treat them is important to the to the general physician. The possible serious consequences of the diseases I have cited command for them much respect, and in this particular they may be judged to be ill chosen, but I venture the assertion that more present and future suffering and unhappiness, and, looking far to the future, more lives, will be saved by the practitioner who properly recognizes and cares for his acute ear cases than by one who recognizes early and treats properly his cases of appendicitis.

To learn to use the head mirror and ear speculum so that the ear drum can be seen is a matter of a little practice, and not half so difficult as many of the things demanded of us in auscultation, pelvic diagnosis, certain surgical procedures, etc. The method is fully described in text books, and I need only mention the abundant opportunity which every physician has of practising it. With office patients especially, who can be brought to the light, one additional minute will serve for an inspection of the ears; and without the patient thinking anything but that he is being carefully examined, one can soon acquire dexterity in the manipulations, ability to see into all sorts of ears, and a thorough familiarity with the normal drum. To those in large cities, where special clinics abound, the problem is even simpler.

When undertaking to examine the ear, the light is of great, if not first, importance. In my experience the best light is that from the fiber mantel of the Welsbach and similar gas lights. These are now adapted to lamps, and are very good for office work. Good daylight is satisfactory, but so variable as to be impracticable. The most convenient light is the electric, as a cord and lamp can be carried in one's satchel and used at the bedside, where most of the examinations will be made. The best electric lamp is the so-called ophthalmological lamp, with a spiral filament so arranged as to give a very brilliant disk of light. If this is not to be had, a frosted bulb should be used, as the clear glass lamp of the ordinary type gives confusing

lines of light across the field. If electricity is not available, an oil lamp with a large flat flame, turned with the flat side toward the examiner, is satisfactory for bedside work. Without sufficient light, good work is impossible.

The best head mirror is one of about eight-inch focus. Head mirrors, as usually made, have a much longer focus than this, and as one must be close to the ear to see well, the field to be inspected is not at the point of greatest illumination, as it is with a mirror of eight-inch focus. Mirrors are now to be had with large openings, 1.5 to 2 cm. in diameter, and these are easier to use than those with the small hole 1 cm. or less in diameter. One must look through the hole, as the line of sight and the line of light must coincide to enable one to see the bottom of the canal.

With adults, the patient can be put in any position the examiner wishes. Children should be held in the following manner: To examine the right ear, seat the child sideways on the nurse's lap, with its left side against the nurse's body. Pass the child's left arm around the nurse's body under her right arm. The nurse's right hand grasps the child's right hand and right thigh, holding both firmly, with the thigh flexed on the body. The nurse's left hand is pressed on the child's right parietal region above the ear, and the head is pressed firmly against the nurse's body. While this is probably not quite so good as wrapping the child in a sheet, yet, with someone to hold the child who has a moderate endowment of physical strength, it answers the purpose very well and much better than any other method that I have tried of holding a child. It is necessary to admonish the nurse to "hold the child firmly till I am through," as the tendency is to turn the little one loose when the examiner's attention is momentarily directed from the ear, when the whole performance of getting everybody in position has to be gone over again, a thing wearing on the patience and tempers of all concerned.

The examination of the ear of a little child is not easy. To begin with, the smallest speculum of the sets as usually supplied is too large, and this should be borne in mind in buying a set. The already small canal is often encroached upon by deposits of cerumen and flakes of epithelium on the walls of the canal, and these tend to be scraped up by the end of the speculum, and obstruct the view. Patient use of the syringe and applicator are necessary, and while the latter may be a little less gentle, it is, in my experience, more satisfactory to wipe the ear with a little cotton twisted on the applicator and wet, than to try to cleanse it with a syringe. This applies to the accumulations of epithelium and cerumen, rather than to purulent discharges, which are thin and more easily disposed of.

When to Examine the Ears. Knowing how to do it understandingly, and having passed the stage when we are still looking at all the ears we can to become familiar with the manipulation, when should a physician feel called upon to examine the ears of a patient—

leaving out of consideration the very obvious cases when the patient complains of a pain in the ear.[1] I should say that it should be done, as a routine measure in children, daily, or at least frequently, in measles, whooping-cough, chickenpox, pneumonia, and acute bronchitis. In scarlet fever, and febrile conditions of obscure and not readily explained origin, the ears should be examined daily. In the scarlet fever cases, the rapidity of the destructive process and the serious effect on the hearing, with the great tendency to chronic suppuration and possible ultimate operation for its cure, demand that these cases be recognized and treated early, in the hope of obviating or ameliorating their serious consequences. A sudden rise of temperature in scarlet fever is often of otitic origin, and suppuration may occur without complaint on the part of the patient of pain in the ear.

In fevers of obscure origin, which the general practitioner has seen many more times than I, the riddle is often suddenly solved by the appearance of a discharge from the ear. How much more creditable it is to achieve the diagnosis than to have it thrust upon us.

In this connection attention has been frequently called to the manner in which acute middle-ear inflammation, especially in children, can simulate serious meningeal and gastro-intestinal disturbance. The reason is not hard to see, for the elevation of temperature causes the restlessness and cerebral and motor disturbances of the ear disorder to simulate more or less a meningeal irritation, especially when associated with pain in the head. In the other case, the disturbance is again through the medium of the temperature, which has suddenly and completely stopped gastric and intestinal secretion and the digestive processes dependent on them. Decomposition and fermentation are followed by auto-intoxication, which may so complicate the clinical picture that it looks like almost anything else rather than an acute otitis. In such a case routine methods only will save us from disaster.

What is Seen. Having cleansed the ear, and finally brought the the drum into view, we will see one of four things: (1) A normal drum, of uniform mother of pearl color; (2) a reddened drum, which may be more reddened in its upper part and along the handle of the malleus; (3) a red and bulging drum, which may vary from a slight fulness to a pronounced blister-like surface; or (4) a perforated drum, in which case pus or other secretion can usually be seen to exude from one spot on the drum, unless the drum is wholly or partially destroyed.

What to Do. Having determined to examine the ears, and having found some one of the conditions mentioned above, what must be done? If the ear drum is normal, nothing is to be done. J. F. McKernon, of New York, a few years ago spoke of the danger of

[1] This suggests the propriety of examining the ears of patients who are unconscious from any not easily recognized cause, since a hint may be obtained as to the presence of some infectious intracranial trouble of otitic origin.

mistaking a drum covered by a flake of epithelium, desquamated or ready to be desquamated, for a normal drum. Such a drum would have no lustre, and a little wiping will dislodge the dead tissue and disclose the true state of affairs.

If the drum is simply red, still not much is to be done in the way of active treatment; inspection of the nose and throat, renewed care of the skin and the secretions, protection from cold, and possibly inflation with the Politzer bag would be in order, and if any pain is complained of, a warm application to the ear is grateful. This may vary from a shawl or warm flannel pad to a hot water bag.

If the drum is red and bulging, we have then to deal with a fully developed otitis media with exudation. At this time we cannot tell whether the exudation is purulent or not, and I think we get in the habit of proceeding on the supposition, or at least the hope, that it is not. With this condition present there is more general disturbance, and, conversely, in seeking the cause of a considerable general disturbance, such as high temperature, cerebral irritation, etc., such an ear could be justly regarded as the cause of the symptoms, and the treatment would be governed to a considerable extent by the severity of the symptoms. If these are moderate in severity, with the fever not alarmingly high and not much complaint or evidence of pain, and no cerebral or gastro-intestinal irritation, then we may temporize. The nose and throat should be looked to, and such treatment applied to them as seems proper. But let me say that very often we can do very little in this direction, except a warm alkaline wash, either sprayed into the nose, or instilled from a teaspoon or medicine dropper. More active treatment is difficult to apply, and, on account of the traumatism attending its use, might do more harm than good. I refer especially to the application of astringents to the nose and nasopharynx. The bowels should be opened, preferably with calomel, the skin and kidneys seen to be properly functionating, and the child protected from exposure. To the ear we can apply heat in some convenient form. A hot brick, hot water bottle, electric lamp, hot salt bag, etc., suggest themselves as forms of dry heat, which had better be applied continuously. Moist heat is applied by flowing water from a fountain syringe into the ear. The technique must be carefully explained to the nurse. The bag should be hung or held a foot or two above the patient's ear, since there is nothing to wash out and all that is necessary is to get a flow of water into the ear. The water should be as hot as can be borne on the forearm, that is about 110° to 115° F., and at least two quarts should be used at a time. The tip of the nozzle or tube, of course, should not obstruct the meatus. Many of us recall Dr. Wm. Goodell's illustration of the washerwoman's fingers as illustrating the difference between the effects of short and long hot douching, and that point is to be applied here, as we want the constringing effect of the hot water. After finishing the douche, the ear should be dried and a warm or hot application made externally.

Drops are much used, and, undoubtedly, often relieve pain, and this is as far ahead as the lay woman looks. The most commonly used is a mixture of laudanum and olive oil. It is objected to as being dirty, but will probably continue to be used, and I cannot say that I have ever seen any ill effects from its use. I much prefer a warm 10 per cent. carbolized glycerin, which will do all that any solution will do, and is a protection from, rather than a cause of, infection in case of a rupture of the drum.

I have been often impressed with what strikes me as the happy effect of a single full dose of opium in this condition. I do not wish to be understood to say that children with earache are to be drugged into insensibility, but one full dose of opium often quiets symptoms, and during the lull the process subsides and is not the cause of further trouble. I am sure that the physiological action of opium is such as to make such a thing possible, if not likely.

It is well for our reputation as prophets that we should warn the parent, when the least bulging is present, that the drum may rupture and the ear discharge at any time; the alleviation of subjective symptoms gives no assurance that this will not occur.

If these measures fail to relieve the situation in twelve hours, or if the symptoms are of considerable severity when the condition of the ear is first discovered, I think we should not temporize, but at once incise the drum. While no surgical procedure is free from the possibility of unpleasant surprises, this one is practically so and fully justified by experience. The laity is accustomed to it now, but if one encounters an anxious mother who fears the effect on the hearing, she can be reminded that we only anticipate nature, and do no more harm than a spontaneous rupture would do. The drum should be incised freely in the posterior inferior quadrant, under antiseptic precautions and the best possible illumination. The drum is of the thickness of paper, and the knife need not enter deeply.

Local or general anesthesia may be used. Until one has gained confidence in the little operation, general anesthesia is preferable, as it is not always easy to tell which is drum and which is canal wall, and incision of the latter under local anesthesia is very painful. Under general anesthesia the two can be distinguished with a probe. Local anesthesia of the drum is very satisfactorily produced by means of a mixture of equal parts of cocaïn, menthol, and carbolic acid. These substances together form a liquid, which should be applied to the drum under good illumination, by means of a very small wisp of cotton on an applicator. I have often incised the drum by this method without the patient feeling it.

The incision, as a rule, is followed by a free discharge of serous fluid. It is well to keep a little sterile cotton in the canal and change it frequently, but not attempt anything in the way of cleansing unless the discharge becomes thick, when it may be removed by syringing with boric acid solution. If this is done, I think care should be used

to dry the ear afterward with the cotton on an applicator. By packing of the canal with gauze following the incision of the drum, it is claimed that the discharge remains serous until it ceases, and that the mucopurulent character which it otherwise assumes is an evidence of infection. If this should prove to be so, then the canal should certainly be kept filled with the sterile gauze drain.

Attention should be especially directed to one phase of general disturbance which is of serious significance. With evidences of otitis media, there are sometimes seen sudden elevations of temperature to 104°, 105°, or 106°, with a sudden drop, and during the period of normal temperature the child is apparently perfectly well. The temperature will rise again after a few hours, or in a day or more. Dr. McKernon has called attention to this phenomenon as indicative of primary thrombosis of the jugular bulb, a serious condition, necessitating a serous operation.

If on the first examination a discharge is discovered coming from the ear, it should be treated as was suggested in speaking of the treatment of the ear after an incision of the drum. If symptoms arise indicating the presence of complications, such as mastoid pain and tenderness, irregular elevations of temperature with a sudden drop, or a persistence of the pains or temperature after the ear has begun to discharge, I think it is the duty of the general practitioner to have the opinion of an otologist.

The following brief notes of a few cases are suggestive:

CASE I.—*Acute Otitis Media Causing Symptoms Resembling a Gastro-intestinal Disturbance.*

A little girl, aged nine months, and previously healthy, was taken sick with high temperature (103° to 104°) and constipation. In about twelve hours abdominal distention was noted, with tympany. The bowels were moved by an active cathartic, the discharges being very foul smelling. No diagnosis was made until the left ear began to discharge, when the temperature at once subsided and the abdominal symptoms rapidly disappeared. I did not see the child until the ear had begun to discharge, and the diagnosis was "thrust upon us."

CASE II.—*Otitis Media Occurring in the Course of Acute Bronchitis and Causing Symptoms of Cerebral Irritation.*

I was asked to see infant G., aged six months, who had a mild acute bronchitis. The temperature had been about 100°, but suddenly rose to 102°, and the child became extremely restless, throwing the head back and tossing it from side to side. There was a demonstrable nuchal stiffness, the pupils were moderately dilated, and the eye grounds were normal. The left ear drum was found red and bulging, and paracentesis allowed the escape of a considerable quantity of serum, stained with blood at first from the incision of the drum. The temperature at once dropped to 99° and the child slept quietly nearly all night. The subsequent course of the otitis and the bronchitis was uneventful.

CASE III.—*Otitis Media Complicating a Severe Bronchitis.*

The patient was a little girl, aged five years. She had a severe bronchitis with a temperature of 102 ° to 103°, but the physical signs in the chest and the temperature indicated subsidence of the bronchitis. Suddenly the temperature rose to 103° or 104°, with distinct complaint of pain all over the head. A bilateral otitis with bulging drums justified double paracentesis, which was done under local anesthesia with the cocaine-menthol-carbolic-acid mixture. A free discharge of serum, becoming later mucopurulent, occurred, with subsidence of the temperature. The child was unable to locate the pain as situated in the ears. There was later a further development of the bronchitis, with fresh exacerbation of temperature, explained by the physical signs in the chest and apparently not due to the ears. Drainage of the ears was sufficient and ultimate recovery perfect.

CASE IV.—*High Temperature, Without Apparent Cause, Due to Otitis Media.*

This patient was an infant, who suddenly developed a temperature of 103°, without apparent cause. The restlessness was very marked, and in the course of a routine examination one ear was found inflamed, with a red and bulging drum. Paracentesis allowed a free serous discharge, with prompt relief of all the symptoms.

This case in my experience is a common type, and other similar ones could be quoted.

I well remember Dr. Agnew beginning his closing lecture at the University of Pennsylvania by saying that there were two operations every medical man should be able to do, tracheotomy and the operation for strangulated hernia. May I suggest the addition of paracentesis of the membrana tympani?

REVIEWS.

THE PRINCIPLES AND PRACTICE OF MODERN SURGERY. By ROSWELL PARK, M.D., Professor of Surgery in the University of Buffalo, Buffalo, New York. Pp. 1074. Philadelphia and New York: Lea Bros. & Co., 1907.

THIS excellent work is much more than a synopsis or condensation of the *Treatise on Surgery*, by American authors, which Dr. Park edited, and the material of which, since the exhaustion of the last edition, he has, with permission, freely used in the preparation of the present volume.

The scope of the book is as comprehensive as is that of most "Systems" and, in the main, this is justified by the admirable use the author makes of the space at his command. Surgical principles and surgical methods are quite adequately considered, and as to these portions of the book it may be said at once that they represent in a concise and readable form the best modern views. An excellent example may be found in the chapter on asepsis, antisepsis, and wound treatment, which should, however, be read in closer relation than it occupies in the book to the section on auto-infection. Both contain teachings of great practical value which, while not original with the author, are nowhere better presented. It might be desirable, however, to modify somewhat the statement that "the appearance of pus in a wound is a reflection upon the surgeon." It would be well if every operator had a surgical conscience that would lead to inner probings and tend toward self-reproach whenever suppuration occurred in a wound of his inflicting; the author says truly that the ideal aseptic technique will include many days of both local and constitutional supervision; but that by any method all the forms of auto-infection can be avoided in every case no one believes, and some of them may result in suppuration.

As to the forms of blood poisoning in which the poison has not had its origin in the wound, it is certainly true, as the author says elsewhere, that the surgeon is often not responsible, unless he has neglected to avail himself of certain precautions, namely, the preliminary elimination from the system—by diuretics, laxatives, and diet, aided often by massage strychnine, etc.—of all excess of waste products and intestinal toxins.

In the section on surgical diseases are considered the surgical fevers and other infections, including tuberculosis and syphilis. Some of the author's statements in regard to the latter disease might perhaps be modified with advantage. To say that in the tertiary stage of syphilis its transmission by inheritance and inoculation is "exceptional" is greatly to understate the enormous rarity of such transmission in the typical late tertiary period, if, indeed, in that stage, it ever occurs. In our opinion it does not. The remark that the physiological secretions, *e. g.*, saliva, milk, perspiration, tears, and urine "are not generally believed to be capable of transmitting the disease" is also much too mild. It is probable that no authentic and fully satisfying case of such transmission has ever been recorded. The statement that when the syphilitic father, by means of diseased spermatozoa, directly infects the ovum (without previously infecting the mother), "such infection is quite different from the infection of the ovum by the mother who has acquired the disease, the father having escaped it," might be misleading to students and seems, doubtless inadvertently, to suggest a distinction where there is really no difference. The *method* of infection, *i. e.*, the route of access of the poison to the ovum, may be different (though even that is uncertain), but the resulting infections are, of course, identical. The statement that when the epitrochlear lymph nodes are enlarged without evident and local cause "syphilis is always to be suspected or even diagnosticated" is much too strong, and if acted upon literally would work great injustice to many innocent persons. The importance of these nodes in the diagnosis of syphilis has always been greatly overestimated. Their characteristic enlargement, in the presence of other but doubtful symptoms, constitutes presumptive evidence of syphilis, as does the similar enlargement of the postcervical chain, but beyond this in positiveness of assertion it is not safe to go.

In the treatment of gonorrhea, included in this section, there seems no reference to the internal administration of boric acid or salol, though in their practical value as urinary antiseptics these drugs are not equalled by the balsams here recommended. The statement that "alcoholic and sexual indulgences seem to materially lower the susceptibility" of individuals to gonorrhea seems opposed to ordinary experience. For "susceptibility" we should read "resistant power."

In dealing with stricture of the urethra too much latitude is inferentially allowed in the performance of internal urethrotomy; at least, no emphasis is placed upon the increase of danger as the membranous urethra is approached or when it is invaded.

A fairly careful survey of the book has led to the following scattered memoranda as to points of minor importance, some few of disapproval, which, however, serve by contrast only to emphasize the undoubted value of the work as a whole:

In the treatment of general furunculosis no mention is made of the internal administration of mercuric bichloride, of which the reviewer could say (as the author does of aromatic sulphuric acid) that "in the absence of recognized constitutional conditions" he has never found anything to equal it.

The opsonic treatment for furuncles and anthrax is perhaps too recent to have reached the "text-book" stage, but it is odd that no mention is made of Bier's treatment by hyperemia, even if it were thought unworthy of approval.

In considering neuropathic joint disease it is said that "the morbid changes within the joints comprise imaginary combinations of atrophy and hypertrophy." Such combinations are occasionally so real that it would seem as though the use of the word "imaginary" was probably a typographical error.

Is it not somewhat radical and, from the standpoint of possible malpractice suits somewhat unsafe, to say of fracture of the internal condyle of the humerus: "To dress such a fracture in the right-angle position is bad practice"? Stimson, for example, advises "rectangular flexion;" Scudder, "acute flexion;" Eisendrath, "splints to maintain the elbow-joint in a right-angled position." The *American Text-book* calls attention to the occasional tilting of the fragment even in full extension (the method employed by the author), to the possible impairment of the ultimate result, especially in the young, by the excessive formation of callus, and to the fact that satisfactory results can usually be obtained by treatment with a posterior rectangular splint; it inclines, moreover, to favor the acutely flexed position in the majority of fractures near the elbow-joint.

Twenty-one lines seem a very parsimonious allotment of space to fractures of the tibia, in consideration of their great frequency and practical importance.

The section on the abdomen and abdominal viscera, and that on the peritoneum, are among the most admirable in the book. The remark apropos of intra-abdominal disease, that "a careful blood count, especially a differential count, will often be of service, though it will occasionally mislead," while absolutely correct so far as the bare statement goes, seems to convey, on the one hand, too little appreciation of the frequent decisive character of the information obtained from a blood count, and, on the other, too great apprehension of being misled by it.

In speaking of the previous history of cases of suspected intestinal stricture it is said that "a history of typhoid, of dysentery, of tuberculosis, or of syphilis will be most suggestive," no attention being called to the fact that stricture after typhoid is almost unknown, but is relatively common after the other diseases, especially tuberculous ulceration. The anatomical explanation of this fact has reference to the circular arrangement and close approximation of the tuberculous ulcers (following the course of the intestinal vessels) as

compared with the irregularly longitudinal distribution of Peyer's patches on the side of the intestine farthest removed from the mesentery.

In the directions for the preparation of a patient for a pancreatic operation, no mention is made of calcium chloride, though Robson and Cammidge say, without qualification, that the hemorrhagic tendency so fatal in many of these cases "can be successfully counteracted" by the administration of this drug. It would seem that it certainly should be used, and therefore alluded to, but it is doubtful if it is so truly a specific as they assert.

Of orchidectomy for hypertrophy of the prostate it is properly observed that "the method proved disappointing, although doubtless more or less effective in some cases, and so objectionable to many patients for obvious reasons that it has been practically abandoned."

The parasitic theory of malignant tumor formation is embraced by the author, with due caution, and his reasons for both the embrace and the caution are convincingly and interestingly set forth. Referring, however, to "inflammation" as meaning necessarily either "hyperemia, irritation, or infection," he says that he seems "to have completely ruled it out as by itself an active cause leading to tumor formation," yet in the same paragraph he says of irritation: "This has been acknowledged as a factor in the etiology of tumors, but as an uncertain one." There is no real contradiction here, but the argument would be clearer if at least the words "*by itself*" were italicized. The statement that malignant growths are "never encapsulated" (p. 293) would seem to conflict with the assertion that "sarcomas are sometimes encapsulated" (p. 273).

The author says that the parasitic theory of cancer lends plausibility to the statement which he wishes to emphasize, that cancer, like many of the other infectious diseases, is at first a local condition, that it is not transmitted by inheritance, and that there is a time in the history of every cancer when, if it could be recognized sufficiently early, and if it were also accessible and thoroughly removed, it could be cured. Theory apart, this is almost the most important lesson that could be taught to the general practitioners who are but slowly awakening to the fact that the "curability" of cancer depends more upon the *earliness* of operation than upon even its extent and thoroughness, important as they are. But why does the theory of infection support the view of the curability of cancer by early excision, and fail to apply to the abortion of syphilis by early excision of the chancre? Practically both statements—viz., that cancer is curable by thorough removal in some very early stage, and that nothing that can be done to the chancre has any effect in aborting syphilis—are probably true. But *theoretically*, if infection is to be invoked in the cancer cases it should equally apply to the syphilitic. The assertion that it is "an error" to suppose carcinoma to be a disease of middle and usually of advanced life is itself erron-

eous unless the error lies in the supposition that it is confined to those periods. The general truth of the idea is not invalidated by the occasional occurrence of cases at an earlier age. Indeed, the author immediately says: "To be sure, carcinoma is rare below the age of thirty."

To define hematomyelia as hemorrhage "within the central canal" of the cord, and hematorrhachis as "hemorrhage within the membranes or structure of the cord itself," is not in accord with present usage of those terms. They are often employed somewhat vaguely, but it would seem advisable, both etymologically and practically, to limit the former term to the lesions involving the central canal or the cord, and the latter to the extramedullary and extrameningeal lesions.

A very few typographical errors—("sated" should be "stated" on p. 896, "doing" "during" on p. 223, "wound" "would" on p. 948), an undue partiality for the split infinitive—"to so adjust," "to materially lower," etc.—an occasional inadvertence—"the use of rubber gloves is not ideal, but gives the nearest approach to it"—"*variate*" as a verb, "the lower portions of the spine are * * * more *protracted*"—may be mentioned, but rather as evidence that the reviewer has departed from the established custom of critics and has read the book, than from any importance of their own

Taken altogether it is one of the most readable, most comprehensive, most thoroughly modern, most practical, and most generally satisfactory of all recent additions to surgical literature. Nothing less was to be expected from Dr. Park, and no reasonable critic will be disappointed. He and the publishers are to be congratulated on the illustrations, the general make-up and appearance, and, above all, the contents of this admirable treatise, which, like all of Dr. Park's contributions to surgical literature, will be found to be an essential part of every working surgical library. J. W. W.

PHYSIOLOGY OF THE NERVOUS SYSTEM. By J. P. MORAT. Authorized English edition, translated and edited by H. W. SYERS, M.A., M.D. (Cantab.). Pp. 680; 263 illustrations, 66 in color. Chicago: W. T. Keener & Co., 1906.

PROF. MORAT'S work on the *Physiology of the Nervous System* has been so well and favorably known for many years that we note with pleasure its translation into English. The translator, however, in his efforts to express shades of meaning has made this work difficult reading; it would have been far better had he expressed himself more clearly and in his own way.

In the first part of the work the elementary nervous functions are

discussed. Under this head the author takes up the neurons, giving first the anatomical data and the functions. He subscribes to the views generally held and believes in the laws of Wallerian degeneration. He next takes up the effects of stimulation of the nerves, considering in detail the effects of different stimuli, especially electrical. The second part is devoted to elementary systematic functions, including the question of the relation of sensibility and movement, reflex acts considered in their broadest sense, consciousness and unconsciousness, and the functions of the different portions of the cerebrospinal system.

Prof. Morat's views of the relationship between sensation and motion are broad. He justifiably states that it is impossible to point out exactly where sensation ceases and motion commences, the passage from one to the other being general. All that can be said is that from the organs of the senses to the brain the development of the physical phenomena of sensation is progressive, while from the brain to the muscles it follows a retrograde course, ending by external movement. He subscribes to the views of Brissaud, who distinguishes between radicular metamarism and spinal or medullary metamarism. By the former is meant that which is evident by the anatomical arrangement of the nerve roots, and by the latter that which is based upon the fact that the segments of the spinal cord correspond to the implantation of the roots or myomers. He further says that radicular metamarism is genuine metamarism, while spinal metamarism in the process of development is reduced to a mere trace. In the discussion of the individual special functions of the roots of the spinal cord he believes that the same root is distributed to several muscles whose function is not univocal, and that conversely the same muscle receives the fibers of several roots. The practical application of this is that it explains why isolated paralysis of an anterior root causes only transitory disturbances of movement.

When discussing the probable functions of the different tracts of the spinal cord he accedes to the general views, but states that only part of Gowers' column goes to the superior vermis of the cerebellum. The views he adopts of the sympathetic system are those that are generally held by French authors. He takes little notice of the more recent opinions which have been so well expounded by English writers. He believes that the great sympathetic is a sort of spinal cord or a portion of the spinal cord disseminated in the nutritive apparatus whose functions it controls. He believes that the great sympathetic is formed by the intrarachidian or spinal part and by the extrarachidian or ganglionic division, united to each other by its ganglia. These form two wholes comparable to those which are found in the animal, one of which connects the brain to the cord and the other the cord to the periphery. Each of these wholes plays its part and has its special structure in both of these systems; but while

the arrangement of the deep nerves of the two systems differs, that of the peripheral nerves is very similar.

His discussion of the functions of the cerebellum is very disappointing in the fact that it offers nothing new, being merely a *resume* of what is already known. He takes the view that in the posterior limb of the internal capsule the motor fibers are distinct from the sensory, a correct view, but one which is usually not so strongly held.

He does not subscribe to the opinion of extreme cortical localization, but believes that the motor area is really sensory-motor in function. He rightfully states that the expression "muscular sense" has been incorrectly used in that it has been made to designate all the deeper sensibilities which supply us with information concerning the execution of movement. He takes no cognizance of the work done by numerous American authors as to localization of this sense in the parietal cortex. There is nothing original in his discussion of visual innervation and ocular movements, and he still subscribes to the old view that an oculomotor area exists in the occipital lobes which is more or less interchangeable with the visual sensory area—an erronous view.

The book on the whole is good and is well balanced. The arguments used are excellent and based largely upon comparative knowledge. The strongest part of the book is that which is concerned with the broad principles of sensation and motion, while the special parts which are concerned with localization of function are only ordinary. T. H. W.

THE STANDARD FAMILY PHYSICIAN; A PRACTICAL INTERNATIONAL ENCYCLOPEDIA OF MEDICINE AND HYGIENE, ESPECIALLY PREPARED FOR THE HOUSEHOLD. By PROFESSOR CARL REISSIG, M.C., of Hamburg, Germany; and SMITH ELY JELLIFFE, A.M., M.D., PH.D., of New York; with the Assistance of many American and German Specialists in the Treatment of Disease and Experts in Medicine and Surgery. In two volumes. New York and London: Funk & Wagnall Co., 1907.

IN the preface to this book, the editors refer to what they, perhaps properly, speak of as the long-felt want of a satisfactory work on medicine and hygiene put into such language that the intelligent layman can understand it and make satisfactory use of it. They rightly dwell upon the mistaken theories that are gathered from the ordinary "doctor-book" and the unreasoning interference that often develops from the very imperfect knowledge that is gained from such books, leading the layman to obstruct the work of the physician.

It is undoubtedly well that the laity and physicians should work in greater accord than has often been the case, and that the laity

should have a clearer comprehension of what the physicians are attempting to do than is frequently given them. Likewise, it would, no doubt, be of great value to the public health, in general, if the laity had some knowledge of important hygienic principles. There is no question that most books that have been prepared with the intention of instructing the laity in points relating to hygiene and medicine have an evil effect: because they do give their readers the little knowledge that is so dangerous, and do not give them the knowledge that might be valuable, in a form in which they can intelligently use it. These books are, likewise, often absolutely incorrect in the statements that they contain.

The reviewer considers it quite possible to prepare a book for the laity that would give useful ideas on hygiene and would help them to lead their lives upon more rational lines. It is also possible, but much less easy, to prepare a book that will give the laity a few ideas in regard to illnesses that would suffice to give them some comprehension of the desirability of prompt action in some circumstances, to allay fears that have become traditional in reference to things that need not be feared, and to accomplish various such purposes. This, however, could scarcely be done in any way other than by thoughtfully preparing a series of what would be simple, practical, informal talks; not a systematic discussion of the science and art of medicine, which would be necessarily brief, confusing, and incomplete, but a discussion of individual things that are important to the layman, and in regard to which he needs to have only practical suggestions that will help him to avoid errors and dangers. At the same time, care should be taken that these talks do not introduce distorted ideas into his mind or give him a feeling of willingness to undertake responsibility in regard to illnesses, and, perhaps, quite as important as either of these, that they do not fill his mind with unnecessary fears and apprehensions. In the reviewer's opinion, a book of this kind that would be likely to do a great deal of good and little or no harm has not yet been written. In the absence of one of that character, his feeling is that works of this sort chiefly do harm.

The preliminary portion of the one at present under discussion, in which there is a description of the anatomy and physiology of the human body and of the causes of disease and its treatment—particularly the part relating to anatomy and physiology—is too technical to be clearly comprehended and made use of by a layman; and it is something that he actually does not need, in a technical form. At the same time, it would give many a person a mistaken sense of really having considerable knowledge of such matters, and thereby make him dangerous; because it is necessarily a very cursory discussion of these subjects. The remainder of the two volumes is an encyclopedic discussion, in alphabetical arrangement, of *all* the medical subjects that are considered to be of importance to the layman. Necessarily very brief, they are often in their very brevity, extremely

confusing to the lay mind. They sometimes present very useful and important facts; they sometimes, to the reviewer's mind, give many facts that the laity ought not to be told at all, except by word of mouth when things can be made clearer. While, therefore, the work is planned with seriousness and earnestness and with excellent purpose, the end result is to present a book that is more honest than the usual "doctor-book," but one that contains much matter that will lead to confusion in the mind of the layman or actually give him distorted ideas.

Some of the statements in the book appear sufficiently harmful to make it really a dangerous thing to present to the public, in spite of many individual good things that it contains. For example, the description of the early stages of dementia precox, although sufficiently correct, would, in the form in which it is put, be extremely likely to make apprehensive young persons and their often still more apprehensive parents become unnecessarily terrified lest this unfortunate condition were developing, when nothing at all is the matter except that the child is a little lazy or a little overtired. Such things can certainly not be made comprehensible to the laity without direct conversation and explanation; and it is questionable whether they can be made comprehensible at all, beyond the fact that it is desirable, if any alterations in personal characteristics occur, to have a child examined and studied in order to learn whether there is any mental or physical reason for this that should be cared for. It is difficult enough for an alienist to determine the importance of early signs that suggest insanity; it would appear absolutely impossible to give the layman any book-description of the individual forms of insanity that would lead him to do anything but get into a state of confusion and probably of false terror.

Again, the description of the diet of a child in the second year of life is put in such a form that many a mother would suddenly transfer her infant, upon the beginning of the second year, to so much greater a variety and complexity of food as to do it serious harm. The reviewer has known exactly this thing to occur because physicians had given mothers directions as to the diet in the second year in a form not unlike that in which they are found in this book.

There are, likewise, a considerable number of instances in which the main point, that it would be advantageous for the laity to know about a disorder, appears to have been overlooked, with the result that the description of the disease is really harmful, rather than useful. For instance, in discussing abdominal colic, no emphasis is laid upon the possibility that severe or persistent attacks of "colic" may be due to appendicitis or similar dangerous conditions, or to the desirability of having this determined: there is merely a mild statement that it may be due to dangerous conditions, but no real insistence upon the need, if it is severe or persistent, of learning its exact nature in each case. There is on the contrary a discus-

sion of treatment that would content the mind of many a layman and lead to dangerous delay. Under the heading appendicitis itself, there is no discussion that will soothe undue and exaggerated fears, or that will give any proper warning as to the danger of certain symptoms that the laity might well be taught to look upon as requiring prompt investigation and action; there is merely a technical description of the different forms of appendicitis which would hardly leave a picture in the layman's mind of what he sees or feels or should do. Under the head of sensations of numbness and tingling, it is stated without any further possibilities being considered, that these "are usually associated with grave nervous disorders; although in a number of rheumatic affections numbness and tingling in the fingers and toes may be met with." It is so common to meet with persons who are terrified by a little numbness and tingling due to relaxed vasomotors or similarly mild disorders, and it is so difficult often to convince them that they have no dreadful nervous or cardiac disease, that an incomplete statement such as the above would be likely to produce cruel distress with many who might read it.

These are fair examples of the sort of things that tend to make a book, with an honest purpose, likely to accomplish as much harm as good. D. L. E.

A Text-book of Practical Therapeutics. By Hobart Amory Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia. Twelfth edition; pp. 939; 114 engravings and 4 colored plates. Philadelphia and New York: Lea Brothers & Co., 1907.

A Text-book of Practical Diagnosis. By Hobart Amory Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia. Sixth edition; pp. 616; 203 engravings and 16 full-page plates. Philadelphia and New York: Lea Brothers & Co., 1907.

These companion volumes are issued again in new editions—the twelfth of the *Therapeutics*, and the sixth of the *Diagnosis*. The *Therapeutics* has been much revised: more complete information relating to materia medica has been given, and a considerable number of the recent advances in therapeutic procedure have been introduced, particularly the value of sodium citrate in the feeding of bottle-fed babies; the use of calcium lactate, hypodermically and by the mouth, in hemophilia, urticaria, and oozing hemorrhage; methods for the hypodermic treatment of syphilis; the importance of using saline solutions of exact strength for intravenous injections; the value of citric acid for preventing thrombosis in typhoid fever;

the danger of toxemia after the use of chloroform and ether; etc. Articles upon the treatment of the common diseases of the eye have been revised by Dr. G. E. de Schweinitz; those upon the treatment of disease of the puerperal period, by Dr. B. C. Hirst; and those on antisepsis, gonorrhœa, and syphilis, by Dr. Edward Martin.

The *Diagnosis* also has been thoroughly revised and enlarged. As is well known, the book differs in plan from that of most other books on the same subject. Major attention is concentrated on the clinical phenomena of disease as met at the bedside, the results of laboratory investigations being more or less minimized. The symptoms used in diagnosis are discussed first, and their application to determine the character of the disease follows. In other words, as the author states, the book is written upon the only plan that can be followed in practice, namely, the upbuilding of a diagnosis by grouping the symptoms. How well the author has succeeded in his purpose is amply attested by the popularity enjoyed by the book.

Indeed, of both books one may say that they have merited, as they have received, an unusual amount of professional confidence. In their new revised dress they are even more worthy than ever of this confidence, reflecting as they do to a noteworthy degree our present knowledge of the science and art of diagnosis and treatment. It is a pleasure to note that since the publication of the eleventh edition of the *Therapeutics*, the book has been translated into the Italian and the Chinese languages. A. K.

STÖHR'S HISTOLOGY, ARRANGED UPON AN EMBRYOLOGICAL BASIS. By FREDERIC T. LEWIS, M.D., Assistant Professor of Embryology in the Harvard Medical School. From the twelfth German edition by DR. PHILIPP STÖHR, Professor of Anatomy in the University of Würzburg. Sixth American edition. Pp. 434; 450 illustrations. Philadelphia: P. Blakiston's Son & Co., 1907.

THE new edition of Stöhr's *Histology* has been arranged upon an embryological basis by Dr. Lewis with the author's permission, though scarcely with his cordial approval, since in a prefatory note he disclaims responsibility for the translation, and asks his colleagues who question the correctness of any statement to convince themselves by comparison with the latest German edition that the paragraphs in question were written by him. The book, as it now is, is virtually a new book by Dr. Lewis, combining embryology and histology, clearly and concisely written, and thoroughly up to date. In order to have space for describing the controlling developmental features of the organs, and for presenting their adult structure somewhat fully, directions for preparing sections have been reduced to a minimum: this because Dr. Lewis believes that it is much more

important that a physician should have a knowledge of the structure of the adult organs and the developmental possibilities of their constituent tissues that that he be familiar with the details of many staining methods—in which we quite agree with him. The nomenclature adopted throughout is that of the German Association of Anatomists. To those who approve of teaching histology upon an embryological basis, the book will appeal as one of the best if not the best; indeed little more need be said in commendation of the book than it has already gone through twelve editions in German and six in English. A. K.

PROSTATIC ENLARGEMENT. By CUTHBERT S. WALLACE, M.D., B.S. (Lond.), F.R.C.S. (Eng.), Surgeon to the East London Hospital for Children, and Surgeon to Out-patients, St. Thomas's Hospital, etc. BACTERIOLOGY by LEONARD S. DUDGEON, M.R.C.P. (Lond.), Bacteriologist to St. Thomas's Hospital, etc. Pp. 215; 80 illustrations. London: Henry Frowde, Hodder & Stoughton, 1907.

THIS manual is the result, we are informed by the author in his preface, of investigations "undertaken to find a satisfactory solution of the success of the operation known as 'total prostatectomy.'" It is, therefore, based on original work, and certain portions will be gladly read by those who are interested in knowing the anatomical basis for their surgical treatment. Had the author been content to limit his treatise to these facts, the volume would not have suffered. He has, however, included a desultory description of the symptoms, diagnosis, and treatment, which is not sufficient for the knowledge of students, and which is superfluous to those who have other special treatises at their command.

The views which he advances are elaborations of those which have already been published over his name, and the correctness of which is very generally recognized. The points on which he insists most strongly in the introductory chapters are: (1) The bilobed nature of the prostate gland, and its development in the form of specialized urethral glands; and (2) that the fasciæ surrounding the prostate are not such distinct planes of connective tissue as they are usually described to be.

Two classes of enlargement of the prostate are recognized—encapsulated and diffuse. The former he regards as adenomatous in character, and probably truly neoplastic. He again insists, and there is little doubt that it is correct, that, in prostates whose enlargement is due to this form of growth, the capsule consists of a peripheral condensation of the prostatic stroma, produced by the overgrowth of the contained glandular acini, and that within the concentric layers

of this capsule it is usually possible to detect glandular elements, which have not themselves been affected by the adenomatous change. The second (fibrous) class of prostatic enlargement, which he thinks is encountered in not more than 15 per cent. of patients, has no compressed stroma in the form of capsule, and enucleation is impossible. He acknowledges the existence of all grades between the two extreme forms of adenomatous and fibrous change; and he thinks it even possible that the adenomatous is a later stage of the fibrous enlargement. It may be remembered in this connection that Mr. Freyer has sometimes advised patients to postpone operative intervention until the enlargement shall have become still greater, and the prostate "shakes itself loose," as it were, from the surrounding tissues; because he has found by experience that enucleation will then be easier.

Mr. Wallace rejects the inflammatory theory of the production of prostatic enlargement, supported by Ciechanowski and others; he contends, and Mr. Dudgeon, in his bacteriological studies, takes the the same view, that the aggregations of round cells found in these organs are merely lymphatic in character, since similar groups of cells may be found in normal prostates and in those of children. Mr. Dudgeon believes that when bacteria are present in enlarged prostates the bacillary invasion is secondary to the enlargement, and in no way a contributory cause; and that, in particular, there is no evidence whatever of a gonorrhœal origin of prostatic enlargement.

Mr. Wallace prefers, and we think his preferences are founded on solid ground, to employ the suprapubic operation of enucleation, so widely popularized by Freyer, in all cases in which it is not contraindicated. For the fibrous prostates, which must be removed piecemeal, as a rule, he prefers the perineal route. He thinks it "very doubtful if the refinements, such as leaving the bladder, urethra, and vasa deferentia intact, can readily be carried out in the majority of cases" of the perineal operation.

The volume closes with a short chapter on carcinoma of the prostate. Among 64 enlarged prostates carefully examined microscopically at St. Thomas's Hospital, carcinoma was found in 8 cases. Wallace dwells on the possibility of distant metastases (*e. g.*, in the pleura) before the growth has extended locally beyond the limits of the prostate itself. He deems cystoscopic examination very useful in suspicious cases. He is open to conviction as to the benefits to be derived from Dr. Young's extensive perineal operations in these patients. At present he thinks the benefits have not been adequately demonstrated. A. P. C. A.

NOTHNAGEL'S PRACTICE: DISEASES OF THE INTESTINES AND PERITONEUM. By HERMANN NOTHNAGEL, M.D., Late Professor of Special Pathology and Therapy in the University of Vienna. Edited with additions by H. D. ROLLESTON, M.D., Physician to St. George's Hospital, London. Authorized translation from the German, under the editorial supervision of ALFRED STENGEL, M.D., Professor of Clinical Medicine in the University of Pennsylvania. Second edition; pp. 1059. Philadelphia and London: W. B. Saunders Co., 1907.

THAT a second edition of Nothnagel's *Diseases of the Intestines and Peritoneum* should be called for occasions no surprise: the excellence of the original and the care bestowed upon the English translation rendered such an event almost inevitable. Although the death of the distinguished author is lamentable, the book has fallen into excellent hands in the person of Dr. Rolleston, who with commendable industry and painstaking has made many additions throughout the text to make it conform to present-day knowledge. The volume is unquestionably the standard by which for some time to come the excellence and deficiencies of other books on the same subjects must be measured. A. K.

PRIMARY NURSING TECHNIQUE FOR FIRST-YEAR PUPIL NURSES. By ISABEL MCISAAC, formerly Superintendent of the Illinois Training School for Nurses. Pp. 197. New York: The Macmillan Company, 1907.

MISS MCISAAC has prepared a book designed to give the pupil nurse, at the beginning of her training, simple definite instruction in technique. The book contains detailed instructions for the proper carrying out of the many matters that make up the routine of the nurse's work, such as ward hygiene, making beds, giving baths, enemas, hypodermatic injections, etc., local applications, the observing and recording of clinical data, etc. There are also splendid suggestions for a series of clinical demonstrations—which should form part of the instruction of every junior nurse. Throughout the author is careful to insist that all subjects in the nurse's curriculum should be taught in their relation to nursing, and not to medical practice. The book is assuredly the equal of, if indeed it is not better than, other books on the same subject; unquestionably it should be the primer in all training schools for nurses.
A. K.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Experimental Studies in Toxic Nephritis.—SCHLAYER and HEDINGER (*Deut. Arch. f. klin. Med.*, 1907, lxxxx, 1).—Much discussion still obtains as regards the clinical and anatomical classification of kidney lesions. While the conception of a tubular and a glomerular nephritis has become general, it must be admitted that innumerable intermediary grades occur, and we are hardly warranted in judging physiological activities by histological lesions. Thus, there is no guarantee that the glomeruli in tubular nephritis must have performed their normal functions because after death they show no lesion. Cohnheim was of the opinion that they are affected, but that the methods of investigation are too gross to discover the changes. Ribbert believes that glomerular involvement is the initial lesion in all acute nephritides, while Bernstein contends that parenchymatous changes are primary, and vascular and connective-tissue changes secondary. Clinical observations are inconclusive as indices of the anatomical changes, although Senator has drawn clinical pictures to correspond to the two pathological types. In their studies in experimental nephritis, Schlayer and Hedinger made observations upon the reactions of the renal vessels, the general blood pressure, and the diuresis. The activity of the renal vessels was obtained by measuring the volume of the kidney in an oncometer. The blood pressure was continuously taken and the diuresis measured by registering the drops of urine as they flowed from each ureter. After studying the reaction of normal kidneys to various stimuli, they applied the method to animals with toxic nephritis, and found that they were able to separate sharply two forms of functional reaction. In cases of chromate and sublimate poisoning, in which it is shown anatomically that the tubules are chiefly affected, it was observed that in the beginning, when there is already severe anatomical change, as indicated by large amounts of albumin in

the urine, there is normal or even increased contractility and dilatability of the renal vessels, associated with polyuria and marked diuresis. In later stages and only after larger doses there is gradually developed a diminution in the dilatation response of the renal vessels and of the diuresis, while the contractility remains normal or becomes exaggerated. When there is extreme anatomical destruction of the tubules, with slight involvement of the glomeruli, dilatability and diuresis are completely lost, but contractibility, although diminished, is retained.

In the second group of cases, in which the glomeruli are definitely affected, as illustrated in cantharides and arsenic poisoning, the functional picture is quite different. Even after minimal doses and in a very short time after their administration there is a tremendous damage to the dilatability and contractibility of the vessels with the disappearance of diuresis. The clinical symptoms are much less marked than in the chromate cases; there is much less albumin and fewer casts, the only striking feature being the large number of erythrocytes. These alterations in the contractility of the vessels, Schlayer and Hedinger show, are definitely due to local changes, and the consquent loss of diuresis does not depend upon general blood-pressure changes. These two forms of nephritis, the tubular and the vascular, represent definite types to which the lesions produced by various poisons more or less closely conform. Changes from one form into the other do not occur, although combined forms are observed toward the end of the disease.

As further conclusions from their work, Schlayer and Hedinger point out that albumin is excreted by the tubular epithelium as well as by the glomeruli; that casts originate in the tubules; that there is a direct relation between the condition of the vessels and diuresis; and that diminished water excretion is due to a vascular lesion, even in the tubular type of nephritis. The general blood pressure in the vascular type shows from the first a gradual decline, which finally reaches minimal values. In the tubular type it is increased and remains high until the end. This would indicate that the poisons producing vascular lesions attack the centres as well as the peripheral vessels. Krehl points an analogy in human pathology. In corrosive sublimate poisoning there is increased blood pressure, while in diphtheritic and arsenical nephritis there is no increase.

Experimental Studies of Nephritic Œdema.—SCHLAYER (*Verhandl. d. Cong. f. innere Med., Wiesb.*, 1907, xxiv, 208), continuing the interesting researches reported in the preceding note, takes up the question of the origin of nephritic œdema. Does the cause of this œdema lie in the kidney, in extrarenal influences, or in a combination of the two? The only way to approach the question would appear to be by a comparison of the functional activity of the kidney in hydropic nephritis with similar conditions in which œdema is absent. The discovery of a poison (uranium) which produces in animals a nephritis associated with œdema has offered such an opportunity. Uranium nephritis, curiously enough, is associated with few anatomical changes in the glomeruli. The alterations are mainly epithelial. Richter and Georgopulos have shown that water as well as water-and-salt retention bring on the œdema. Heineke has demonstrated an hydropigenic substance in the serum of animals poisoned by uranium. But this interesting observation yet fails to settle

the question as to whether the fundamental cause of the œdema lies in the condition of the kidney or depends upon extrarenal influences. Studying uranium nephritis by the methods described in his preceding article (see the preceding summary), Schlayer found that the behavior of the kidney toward stimuli of all sorts was exactly the same as that of the organ in chromic acid and sublimate nephritis. The variations in blood pressure follow the same rules; the anatomical picture is similar. In one respect, however, these cases of uranium nephritis differ strikingly from the tubular nephritides without œdema. According to the size of the dose, in from twenty-four to forty eight hours the contraction stimuli produce their normal effect. On intravenous injection of a few cubic millimeters of 5 per cent. salt solution the volume of the kidney increases rapidly with marked pulsation, just as in the normal kidney, *but the diuresis, which was previously normal, suddenly ceases instead of increasing.* On injection of caffein, the diuresis returns, but only to a moderate degree. In other words, on the injection of NaCl, instead of an increase in diuresis there occurs a sudden anuria at a time when the vessels show otherwise apparently normal functional activity. This occurs also in a somewhat diminished degree on intravenous injection of water with very small quantities of salt (0.3 per cent.), as well as with other saline diuretics. What is the cause of this remarkable condition? The anatomical changes differ in no way from those found in chromic acid and sublimate poisoning, while the vessels still show normal anatomical appearances as well as normal contractility and dilatability. One must apparently ascribe this anuria to a diminished permeability of the vascular apparatus of the kidney for which no anatomical or physiological cause is at the moment to be found.

After several days of anuria these anmials show œdema. The analogy between the functional conditions in these uranium kidneys and in the behavior of chronic nephritis in human beings, as observed by Strauss, Widal, Müller, Heineke, Pässler, and others, is striking. In both cases there is an insufficiency of the kidney following increased administration of salt and water, while, anatomically, the changes in the human kidney are closely similar to those in uranium nephritis. It would appear, then, that the determining cause of the insufficient elimination does not lie in the lesions of the tubular epithelium, but in the diminution or disappearance of the permeability of the vascular apparatus of the kidney, and that the apparent anatomical intactness of the glomeruli does not allow us to presuppose normal functional powers. But this diminished permeability of the renal vessels is not of itself sufficient to account for the œdema. The experimental introduction of large quantities of salt and water immediately after the period of onset of impaired permeability is not followed by œdema. Four or five days later, however, this begins to appear. One is led, therefore, to the probable conclusion that other changes in the cutaneous capillaries must first occur to render the onset of a general œdema possible. These observations then support the old Cohnheim-Lichtheim hypothesis as to the origin of œdema.

To summarize: These interesting observations appear to show that the hydropic uranium nephritis differs from the other non-hydropic tubular nephritides in that the renal vessels become impermeable much earlier to increased quantities of water and salt. But this retention is not alone sufficient to cause the development of œdema. Changes must

first occur in the cutaneous capillaries. The retention of water and salt is essential for the development of œdema, for in animals fed upon a dry diet œdema does not occur. The author, in conclusion, emphasizes particularly the fact that his experiments show that "anatomically intact renal vessels may be wholly insufficient from a standpoint of excretion, while, moreover, a normal contractility and dilatability give no assurance of a normal secretion."

Note on a Danger in Urine Testing.—W. J. RUTHERFORD (*Glasgow Med. Jour.*, 1907, lxviii, 196), while recently making routine examinations, was injured by the explosion of a test tube to which he was adding nitric acid while testing for the presence of albumin. On seeking the cause of this explosion he found that the test tube had previously been used in testing for blood with the guaiacum-blue reaction; to the sides of this tube a little of the precipitated guaiacum was still adherent. Rutherford found that the addition of tincture of guaiacum to strong nitric acid produced a very strong chemical reaction, while on pouring strong nitric acid into a little tincture of guaiacum the result is somewhat explosive and may be very dangerous, as in his own case. It must be noted, then, that guaiacum and strong nitric acid are incompatible, and too great care cannot be exercised in cleaning test tubes and the like which have contained tincture of guaiacum. The risk of an explosion is even greater if a trace of dry guaiacum resin remain.

The Early Diagnosis and Cure of the "Presuppurative Stage" of Amœbic Hepatitis.—LEONARD ROGERS (*Practitioner*, 1907, lxxviii, 776), through his residence in India, has had a large experience with hepatic manifestations due to infections with Amœba dysenteriæ. In a previous paper he had noted the diagnostic inportance of leukocytosis in acute hepatitis and the good results following the administration of large doses of ipecacuanha in the "presuppurative stage." His present article is based on some additional cases which he divides into the following groups: (1) Cases of acute hepatitis complicated with dysentery; (2) cases of acute hepatitis without dysentery and not treated with ipecacuanha; (3) cases of hepatitis without dysentery treated with ipecacuanha; (4) cases without dysentery or liver symptoms treated with ipecacuanha. In all of these groups except No. 2 the treatment with ipecacuanha in large doses rapidly yielded good results, and in the last group, in which there was fever, a leukocytosis and other vague symptoms which resisted various forms of treatment, these cases quickly responded to the ipecacuanha. In group 2 the patients either had a very protracted illness with gradual recovery or, if followed long enough, usually had a recurrence.

As regards leukocytosis the proportion of polynuclears is commonly comparatively little, if at all, increased. In 13 cases in which a differential leukocyte count was made, in none were as many as 90 per cent. polymorphonuclears present, while in only 3 were there over 80 per cent. Rogers has found this a point of diagnostic value in favor of this infection in contrast to other suppurative or acute inflammatory conditions. In about one-third of his cases an unsuccessful exploratory operation was undertaken before the disease was rapidly cured by the ipecacuanha treatment. He is, therefore, in favor of treating all

cases with this drug first if there be any doubt as to whether suppuration has already taken place or not. In his pathological studies he found dysenteric ulcers in the colon in 18 per cent. of the cases examined, even in those cases with indefinite dysenteric symptoms or when these were entirely absent. According to reports from other sources when the dysenteries are of bacterial origin, ipecacuanha is useless in these conditions.

In conclusion Rogers regards ipecacuanha as invaluable in the treatment of amœbic dysentery, in fact as a specific; in those places where liver abscess is so common he regards this drug as second only in importance to quinine. The doses should be 20 to 40 grains once or twice a day, taken twenty minutes after a dose of tincture of opium. This, he says, in certain cases may abort a "presuppurative" amœbic hepatitis by curing a latent amœbic dysentery that produces it. In those cases without either dysentery or liver symptoms, yet with an intermittent fever and leukocytosis and other vague symptoms, its use is strongly urged by the author.

(This article is of interest on account of the strong conviction of the author as to the clinical value of ipecac in cases of suspected amœbic dysentery. It is difficult, from a pathological standpoint, to understand the term "presuppurative stages of amœbic hepatitis." It must be remembered that the pure amœbic abscess, so long as it remains free from infection, is always unassociated with suppuration.—W. S. T.)

Observations on the Effect of Prolonged and Severe Exertion on the Blood Pressure in Healthy Athletes.—G. A. GORDON (*Edinb. Med. Jour.*, 1907, xxii, 53) has had a unique opportunity of observing the effect of severe muscular exercise on blood pressure. The man was thirty-eight years of age and had arranged to swing Indian clubs for twelve hours continuously on six consecutive days. The weight of the clubs was three pounds. On examination before the test his arterial walls were found to be in a healthy condition; there was no sclerosis, the heart was very slightly hypertrophied, and the maximum systolic pressure was 105 mm. Hg. Observations were made with the Riva Rocci instrument and by Erlanger's sphygmomanometer. Two days before the test the maximum systolic pressure was 100, while the maximum diastolic pressure was 70 mm. Hg. At the end of the same day the maximum systolic pressure was 115 mm. Hg, the maximum diastolic pressure 80, showing a rise of 15 in the systolic and 10 mm. in the diastolic pressure. Readings were taken twice daily during the test and on every occasion in the evening a rise of blood pressure, once reaching as high as 15 mm. Hg, was found. The point of interest is the small difference that existed between the maximum systolic pressure and the maximum diastolic pressure. From the tables and tracings shown in the article it can be seen that every morning the pressure had returned to a normal of from 100 to 107 mm. Hg. The evening rise did not last long, as on the last day one hour after completion of the work it was only 100 mm. Hg. There was also very slight effect on the heart and pulse, the latter rarely varying from 84 both before or after the work. There was no irregularity of the heart and it showed no increase in size, either by percussion or by radiograms. Though the effect on the circulation was so slight, yet analysis of the urine showed the presence of albu-

min in that passed during and after the performance of the work, while in the morning specimens of urine none was found. Gordon has compared these results with those obtained in persons after a severe physical strain, in which case there was always a fall in pressure, more or less marked, and he concludes that: "Long-continued exercise of a more or less gentle character has a tendency to raise the blood pressure, while violent exercise, though perhaps causing first a primary rise, yet is followed later by a marked fall."

Absence and Marked Diminution of the HCl of the Gastric Contents in Cancer Involving Organs other than the Stomach.—JULIUS FREIDENWALD and L. J. ROSENTHAL (*New York Med. Jour.*, 1907, lxxxvi, 344) note that, while the absence of free HCl is an important diagnostic sign in gastric carcinoma it is likewise often absent in those cases in which carcinoma is present in organs remote from the stomach. The authors have carefully examined the gastric contents of 29 patients with various forms of cancer, and of these 9 showed a low total acidity with an entire absence of free HCl, 10 a low total acidity with a marked diminution in free HCl, and the remaining 10 a normal acidity with a normal percentage of free HCl. Thus, in 19, or 65 per cent., there was either an entire absence or diminution of free HCl. It is interesting that this absence or diminution persists after the removal of the cancerous mass. The authors say: "Whether the previous view that the condition is due to an alteration of the degree of alkalinity of the blood plasma is true or not, there can be no question that the phenomenon must be due to some general condition in the blood and that this condition still persists in the fluid even after the removal of the growth." This change in the HCl secretion may be of some value in the diagnosis of doubtful cases of cancer in organs other than the stomach.

Myxœdema.—CAMPBELL P. HOWARD (*Jour. Amer. Med. Assoc.*, 1907, xlviii, 1226), in his careful study of this subject, first reviews the history of the disease, describes its clinical varieties, and gives a detailed report of 10 cases occurring in the service of Dr. Osler, at the Johns Hopkins Hospital. These, together with 92 other cases reported in American literature from 1881 to July, 1905, are then thoroughly analyzed. Among some of the interesting points brought out may be mentioned the following: Its comparative rarity among the negro race (about 1 per cent. of America); its greater frequency in northern or colder climates and also in females. As regards family antecedents and heredity there seems to be some psychopathic tendency in certain families. The question of consanguinity in the parents is most interesting, but more data on this point is needed. The marital state seems also to bear some relation to myxœdema. Howard thinks that the history of exophthalmic goitre preceding the onset of this disease would be more frequently elicited if more careful inquiry were made. He discusses the morbid anatomy, pathogenesis, symptomatology, and diagnosis of the disease. The history of thyroid therapy, of which Byrom Bramwell says: "It is no exaggeration to say that the cure of myxœdema by thyroid treatment is one of the greatest therapeutic achievements of this or any other age," is outlined, starting with the surgical work of Köcher, in 1883, on grafting of the thyroid and so on

up through the various perfections of the idea by von Eiselberg, Victor Horsley, MacPherson, Murray, Howitz, Fox, and Mackenzie. The comparison of the results before and since the introduction of thyroid therapy is striking. Thus in those untreated, out of 19 patients 5 died (a mortality of 26.3 per cent.), 10 were unimproved, and 4 were said to be improved; whereas in those treated with thyroid therapy there were but 5 deaths out of 76 patients; 2 were unimproved, 9 improved, and 60 cured (79 per cent.). Death, in most of the 5 cases, could easily be ascribed to other uncontrollable factors, leaving the low mortality of 4.1 per cent. when compared with that previously of 26.3 per cent. in the untreated cases.

SURGERY.

UNDER THE CHARGE OF

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The Present Position of Spinal Anesthesia.—STRAUSS (*Deut. Ztschr. f. Chir.*, 1907, lxxxix, 275) has made an extensive study of this subject. Tropacocaine, he says, is the least dangerous anesthetic for spinal anesthesia, although it produces a series of disturbances and sequels, and may cause death. The dose of the anesthetic should rather be small than large; 0.006 gram of tropacocaine appears to be sufficient for all cases. By raising the pelvis and using a considerable quantity of a diluted solution, a higher analgesia is produced in the surest and least dangerous manner. The addition of adrenalin seems to act rather injuriously than favorably and should be avoided. Scrupulous care as to technique is necessary in order to avoid danger and error. The average duration of the anesthesia is about one hour. The anesthesia is with certainty limited to the lower extremities and the lower abdominal region. The disturbances from the injection and the later disturbances, through proper technique and selection of cases may be diminished but not entirely avoided. For the employment of spinal anesthesia there are very definite indications and contra-indications. It is indicated in all old decrepit patients in whom the narcosis cannot be produced in any other manner; in non-tuberculous lung diseases, and in diabetes. It is contra-indicated in the young up to fifteen years of age; in neuro- or psychopathic conditions; in diseases of the brain and spinal cord; in septic diseases; in all operations in which local anesthesia can be employed easily. Care must be observed in all tuberculous processes, in syphilis, in kidney diseases, and in all cases of advanced arteriosclerosis, especially of the brain. When it is employed in a proper manner and

in suitable cases, spinal anesthesia offers definite advantages, although it is never without danger. The most efficient means of avoiding danger lies in definite restriction on the lines above indicated.

The Treatment of Acute Intussusception in Children.—HAUSEN (*Mitteil. a. d. Grenzgeb. d. Med. u. Chir.*, 1907, xviii, 129) says that 28 cases of intussusception in children were admitted to the surgical department of the Copenhagen General Hospital, from 1893 to the present. During the same time there was one case of chronic intussusception in a child and a few cases of the acute or chronic forms in adults. They emphasize, particularly, the great danger of conservative treatment, the non-operative or bloodless methods. Operative treatment without delay is the rule which is followed by Hausen at present. He says there can be no doubt of the diagnosis in the 28 cases. The cardinal symptoms were present in almost all. Great care, however, is necessary in the diagnosis of this condition, especially in the absence of a palpable tumor. In several cases of acute gastro-enteritis he was on the point of making the diagnosis of intussusception, but they recovered under dietetic treatment. It would be easy to make such a mistake and if conservative methods of treatment were followed, the credit might erroneously be given to this treatment for the cure of an invagination. Of the 28 cases, 14 recovered and 14 died. There were 17 of the ileocecal variety, 3 of the large, and 3 of the small intestine; 1 was probably an ileocecal and 3 were typical examples of a combination of an iliac and an ileocecal. In 1 case there was simultaneously an ileocecal descending and an ascending invagination of the large intestine.

The Treatment of Inflammatory Strictures of the Rectum.—CLAIRMONT (*Archiv f. klin. Chir.*, 1907, lxxxiv, 180) says that the operative treatment for inflammatory strictures of the rectum should be first considered when conservative methods have failed or cannot be carried out. Every stricture that a small bougie will pass is dilatable, but the method is tedious and not without danger of perforation into the peritoneal cavity. The choice of operation usually lies between rectotomy, extirpation, and colostomy. Rectotomy is done in the Eiselberg clinic only when the stricture is just above the anus and is limited above. Incision of the sphincter is always avoided. Concerning the question as to whether the stricture should be extirpated or should be overcome by a colostomy, Clairmont says that he is in favor of a colostomy with gradual dilatation and irrigation of the affected portion of the bowel from the anus and the colostomy wound. While the method is laborious and tedious, often giving rise to pain and fever, it may be claimed that in the cases in which a colostomy is performed, gradual dilatation can bring about a complete cure and that this method is more effective than a colostomy alone. The colostomy should be placed as near as possible to the stricture on the oral side, as a rule in the region of the sigmoid flexure. The farther removal of the fistula from the stricture interferes with the first passage of the shot and thread through the stricture and its later dilatation. A lateral is always to be preferred to an axial colostomy In the first weeks after the colostomy has been performed, the rectum is to be irrigated with various solutions, as boric and silver nitrate solutions. At the same time in syphilitic cases, antisyphilitic remedies may

be administered. For the dilatation Clairmont employs, exclusively, the conical sound, such as v. Eiselberg uses in œsophageal strictures. In order that the conical sound may be passed through the stricture, a silk ligature must first be passed. In some cases several days' efforts are necessary to succeed in doing this. The ligature, in some cases, may be conducted through the stricture by introducing it into the colostomy wound and carrying it through by injections of fluid. If this fails the fecal current may be tried, while the colostomy opening is closed by adhesive plaster, and castor oil administered to the patient. When this fails, also, a small œsophageal bougie may be passed, usually, from the natural anus, upward. If all these efforts fail, a preliminary posterior rectotomy must be done. For security two ligatures tied together should be passed, of which only one is employed for pulling the sound through. This should be smeared with oil or vaseline, and with a continuous gentle pull, drawn as far as possible through the stricture. It is permitted to remain about an hour, if possible. This is repeated daily. Not rarely the temperature rises from perirectal inflammation, which may lead to abscess. Only when the patient is able to pass moderate-sized sounds, and the secretion of pus and blood has disappeared, can the colostomy wound be closed.

A Prostatic Cancer Removed by the Operation of Freyer, and Some Remarks on the Frequency and Treatment of Cancerous Tumors of the Prostate.—BODDAERT (*Jour. de chirurgie et annales de la Société Belge de Chirurgie*, 1907, vii, 371) reports a case of cancer of the prostate which he removed by Freyer's operation. This was done in the ordinary way, except that the rectum was distended by a Petersen's rectal bag which was left in place during the operation. This rendered the prostate prominent in the bladder and the introduction of the index finger into the rectum unnecessary. Boddaert collected from the literature 27 cases of cancer of the prostate operated on, which with his own made 28. Of these, 7 died a few days after the operation, 12 died in consequence of recurrence or cachexia, in from two to fourteen months after operation; five patients were lost sight of, and in 5 the operations were too recent to permit one to draw conclusions as to the operative results.

A Contribution to the Surgical Study of Tumors of the Head of the Pancreas.—MAUCLAIRE (*Archiv. gén. de Chir.*, 1907, i, 1) reports a case in which he enucleated from the head of the pancreas opposite the internal border, a rounded, polylobed, noncsytic mass of rather firm consistency. There was relatively slight oozing. No glandular enlargement could be felt above the upper border of the pancreas. Cholecystostomy was also performed to relieve a somewhat dilated gall-bladder. From an operative standpoint the patient continued to do well, but he died two and one-half hours after the operation. Microscopic examination showed the mass to be an epithelioma. This was the seventh published case of partial pancreatectomy for a primitive, solid tumor of the head of the pancreas. This operation has been done four times for epithelial cancer, once for sarcoma, and eighteen times for benign tumors: cysts (sixteen cases), fibro-adenoma (one case), tuberculous lymphadenoma (one case). Secondary partial pancreatectomy in the course of ablation of a neigh-

boring tumor, pyloric or colic, is much more numerous. In spite of the vascular and intestinal dangers, the head of the pancreas can be removed to a sufficiently wide extent. In malignant tumors, total removal of the head of the pancreas ought to be completed by a partial or total resection of the duodenum. Complementary operations may be necessary, *e. g.*, a grafting of the choledochus and duct of Wirsung into the duodenum or jejunum, or gastrojejunostomy, but these are complex and very difficult. The palliative operations, cholecystostomy, cholecystgastrostomy or enterostomy, etc., offer little encouragement. The diagnosis of tumors of the head of the pancreas is generally easy, because, unfortunately, they are usually cancers. The benign tumors are rare and difficult to distinguish from parapancreatic tumors. Early exploratory laparotomy will establish the exact diagnosis, and at times may be followed by a curative operation.

Treatment of Lowered Blood Pressure in Peritonitis with Intravenous Adrenalin-Saline Solution.—Hoddick (*Zentralbl. f. Chir.*, 1907, xxxiv, 1193) says that Kothe's recent publication on the influence of adrenalin extract in acute severe heart collapse has led him to report briefly on the experience of the Haidenhain clinic in the treatment of septic peritonitis with the intravenous infusion of saline solution with adrenalin. Their results have been more than satisfactory. Romberg and Pässler have shown experimentally that the disturbances of the circulation occurring in the height of acute infectious diseases are not due to primary influence on the heart, but to paralysis of the circulatory centres in the medulla. The lowered blood pressure is due chiefly to paralysis of the vasomotor centres. Hoddick has employed the saline infusions without adrenalin, but with no remarkable results. It was very different with injections of ¾ to 1 litre of physiological saline solution containing 6 to 8 drops of adrenalin. This was particularly true of severe cases of general peritonitis. Not all of the milder seropurulent cases were treated in this way; camphor, coffee, and subcutaneous injections of saline solutions being sufficient in these. From 1901 to 1904, inclusive, 20 cases of epityphlitic peritonitis were treated by the older methods, and of these 14 died. In 1905 and 1906, 16 cases were treated by the adrenalin method, and of these 3 died. In the operation Hoddick does not remove the pus by irrigation, but by sponging with dry gauze, as less damage is thus done to the peritoneum and the intestines are less disturbed. Gauze drains are employed, and these are removed in from five to eight days. The saline solution with adrenalin is employed if the pulse becomes small, weak, and frequent, with pale cyanotic face and sunken eyes. The effect of the infusion is surprising. The increase in blood pressure and general improvement are observed during the giving of the treatment. The solution is brought to a temperature of 41° C., and requires from twenty to thirty minutes to administer it.

The Pathological Physiology and Pathogeny of Intermittent Hydronephrosis.—Bazy (*Annales des maladies des organs genito-urniaires*, 1907, xxv, 1521) says that intermittent hydronephrosis has very distinct clinical and anatomo-pathological characteristics. From the standpoint of pathological anatomy there should be noted an abnormal disposition of the renal pelvis, of such a character that the urine is retained in the pelvis

without the ureter participating in the retention. There may or may not exist a constriction of the ureteropelvic orifice. On the clinical side the chief phenomenon is a tumor in one or other renal region, coincident with a pain more or less acute and prolonged. The disappearance of the pain coincides with a polyuria often insignificant but also frequently very distinct or very intense, and followed sometimes by hematuria. This intermittent hydronephrosis is independent of movable kidney. Its cause appears to be an original malformation of the pelvis, so that the ureter opens at a more or less high level in the pelvis. There is produced a stagnation in the pelvis which develops into a hydronephrosis. It is, therefore, a congenital affection. The urinary retention is accompanied by an infiltration of urine into the neighboring region by transudation. This leads to an inflammation which is common to all cases of intermittent hydronephrosis, and which determines adhesions of the ureter to the pelvis. These adhesions transform an intermittent into a permanent hydronephrosis. This urinary transudation and œdema ought not to be confounded with passive congestion from circulatory disturbances.

Gunshot Wounds of the Peripheral Nerves and their Treatment.—HASHIMOTO and TOKUOKA (*Archiv für klin. Chir.*, 1907, lxxxiv, 354) state that the number of peripheral nerve injuries coming to treatment during the recent wars is much larger than in the earlier wars. In like manner the traumatic aneurisms are increased in number. These two conditions have become an important part of military surgery. In the Russo-Japanese war the writers treated 47 cases in which the nerve injuries involved the extremities, 27 being in the upper and 20 in the lower. The right radial nerve was most frequently involved. Nerve injuries require treatment more frequently than formerly, because in the earlier wars non-jacketed cartridges of larger caliber were employed and antisepsis was not in vogue. In consequence amputation was more common. In a certain percentage of the cases the lesions were the results of involvement of the nerves in developing cicatricial tissue. It is important that the injury be recognized in the beginning. Often this does not happen because the nerve injury is overlooked in the extensive involvement of the surrounding soft tissues and bones. One of the most constant symptoms is the neuralgia beginning immediately or a short time after the injury is received. Moist dressings may reduce this neuralgia, while their absence may render it almost unbearable. Motor disturbances usually show as a palsy, while disturbances of sensation appear in the form of hyperesthesia. Trophic disturbances are rather frequent, but are not observed until days or weeks have passed. The writers saw their cases usually after from fifty to three hundred days following the receipt of the injuries, because of their great distance from the scene of the fighting. This rendered it impossible often to determine whether the symptoms were due to the original injury to the nerve, to the cicatricial tissue surrounding the seat of injury, or to inactivity of the limb. The statements of the patients as to the original symptoms could not be relied on, because often shock or fear at the time of the injury influenced the judgment. Among their 50 operations, in only 7 did they observe total division of the nerve. In most of the cases there was only a partial injury of the nerve, with laceration or crushing

of the neighboring soft tissues or bones. During the healing of these structures, the nerve trunk was caught in the developing cicatricial tissue or callus, and its functions were thus impaired. The injured portions of the nerves were sclerosed and thickened. The distal and proximal portions showed changes from 3 to 5 cm. from the wound. They were smooth, thin, and hyperemic. In more severe cases the peripheral portions of the nerves were considerably thinned, in some cases to such an extent that they could be followed only with difficulty. Disturbances of motion, sensation, and nutrition were usually observed in the region supplied by the nerve neighboring upon that injured. The writers saw the functions of the median nerve disturbed in a gunshot wound of the radial nerve, without any known cause other than the remote effect of the missile travelling through the tissues. Although it is very desirable that in appropriate wounds the primary suture should be employed at the front, it will generally not be possible to use sutures inside of five weeks from the occurrence of the injury.

A Revolver Ball Tolerated for Six Years. Rapid Death in two Days.—Remy (*Jour. de chir. et annales de la Société Belge de Chirurgie*, 1907, vii, 364) says that a young man was shot in the right temple six years before being seen. The wound of entrance at that time was disinfected, but no attempt was made to extract the ball, which was shown by the skiagraph to be divided into two parts. The smaller was arrested at a depth of 5 cm. against the falx cerebri, and the other was lodged at a depth of 3 cm. in the left temporal fossa. The intelligence and ability to work remained normal until April, 1906, and during this time there was no disturbance of motion or sensation. Then appeared his first attack of epilepsy. After that there were no more attacks until one year later, when a new attack of general epilepsy occurred. This was followed by one attack after the other without intermission. Remy counselled and performed an operation for its extraction, which consisted of making a trephine opening some centimeters in diameter. The part of the bullet removed was located under the cerebral cortex, at a depth of about 1 cm. The removal of the bullet was followed by the escape of a large quantity of turbid fluid, showing the existence of a large cystic pouch at least 7 to 8 cm. deep. On account of the shocked condition of the patient, the effort to remove the second part of the bullet was given up. The patient regained consciousness, but died five hours after the operation.

When a projectile penetrates the cranium there exists for a time a period in which there is danger of infection of the track of the bullet, by shreds of skin, hair, etc. It seems that the longer the time elapsing from the date of the wound, the less the danger. There is, however, no absolute security, as the period of tranquillity may end abruptly at any time. Nimier has cited a tolerance of thirty-two years, but in this case the bullet was encrusted in the bone substance. While it touched and irritated the membranes, it had not perforated them. Remy collected 11 cases in which the missile had lodged in the brain; among these the period of tolerance varied from some months to eighteen years. The greater number ended by a fatal complication due to the presence of the projectile. Peraire's case was cured by operation. The symptoms which terminate the period of tolerance, may be divided into three

varieties. In the first may be placed those in which the symptoms come on slowly and may be relieved. In the second they also come on slowly, but are beyond the resources of the physician. The third class are the more frequent. The symptoms come on suddenly and are of short duration. There is not enough time for operation. Abscesses or cysts open into the ventricles or the meningeal cavities, and cause a meningo-encephalitis or a generalized meningitis. In the future Remy expects fully to explain to the patient the dangers of the period of tolerance, and to propose operation if the localization is favorable.

THERAPEUTICS,

UNDER THE CHARGE OF

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The Treatment of Obesity.—LORAND (*Journal de médecine de Paris*, 1907, xix, 319) states that the best treatment for this condition is prevention. Foods rich in calories should be avoided; to replace these the green vegetables, fresh and cooked fruits, and such carbohydrates as oats, which have small caloric value, should be given. The dietetic treatment is aided by the administration of such waters as Hunyadi, Apenta, etc., and by water cures such as those of Carlsbad and Marienbad. Here the employment of baths augments the favorable effect of the waters. In the treatment of the form of obesity which is not due to over-eating, the administration of the thyroid gland is most likely to prove effectual. The urine should first be examined for glucose. The fresh gland is the preferable preparation; the doses should be small and should be continued for a considerable period. The heart should be watched and if the pulse rate reaches 90 to 100 the treatment should be stopped. In the case of obese women ovarian opotherapy is indicated in connection with the administration of the thyroid gland.

Arsenic in the Treatment of Syphilis.—PLATEAU (*Revue de thérapeutique*, 1907, lxxiv, 13, 458) finds that arsenic possesses a decided antisyphilitic action. In a patient treated by him by the usual methods the papular syphilide was most resistant, but immediately upon the administration of hypodermic injections of sodium cacodylate this symptom began to disappear. Upon resumption of mercurial treatment a recurrence was at once noted; this cleared up under further injections of the sodium cacodylate. Along with the betterment in the cutaneous manifestations the patient's general condition and appetite began to

improve. It seems probable that there are patients who resist mercurial treatment and in whom benefit may be achieved by the administration of arsenic, which in large doses appears to have a direct antisyphilitic action. The cacodylates are particularly suitable under these conditions because they may be given in large doses with less danger of causing toxic symptoms than is the case with arsenic in other forms.

Sodium Anilarsenate in Syphilis.—HALLOPEAU (*Journal de médecine de Paris*, xix, 24, 229) employs the following treatment: The beginning dose of the anilarsenate is, in the ordinary patient, 11 grains given hypodermatically. Two such injections are given, to be followed after a two days' interval by two more. Then a series of four injections of $7\frac{1}{2}$ grains each at intervals of three days is undertaken. These amounts suffice to maintain an active quantity of the drug in the organism. If toxic symptoms, such as gastric disturbance, abdominal pain, general malaise etc., are noted, the treatment should be stopped until these disappear. In addition to the hypodermatic administration of the agent local lesions may be dressed by means of compresses wet in a solution of the anilarsenate or with an ointment containing this substance. In gummas or localized tertiary syphilides the injection of the drug in the neighborhood of the lesion is advised. There is no incompatibility between sodium anilarsenate and mercury or potassium iodide; the three agents may be employed simultaneously if desired.

The Treatment of Hemoptysis.—According to REICHE (*Münch. med. Woch.*, 1907, xxi, 1059) the three essentials in the treatment of pulmonary hemorrhage are: (*a*) to put the patient wholly at rest; (*b*) to influence the pulmonary circulation so that coagulation shall be favored; (*c*) to cause the blood to clot as rapidly as possible. The first two points may be attained by insisting upon bodily and mental quiet and by the application of cold and the administration of morphine. Adrenalin, lead acetate, tannic acid, iron perchloride, ergot, and amyl nitrite have given but poor results in the author's experience and the employment of gelatin in order to hasten the coagulation of the blood was not encouraging, but calcium chloride in doses of 45 to 60 grains daily has an active influence in this regard. It is possible that this salt may be the active element of gelatin. With the calcium chloride, digitalis, morphine, etc., may be associated if indicated.

The Harmlessness of Large Doses of Strychnine.—TROISFONTAINES (*Reveue de médecine*, 1907, xxvii, 532) states that strychnine may be employed in much larger doses than are usually given without producing toxic symptoms. In instances in which heavy stimulation is indicated he does not hesitate to administer from $\frac{1}{12}$ to $\frac{1}{6}$ grain hypodermatically of strychnine sulphate or nitrate and to repeat this dosage up to a total amount of $\frac{3}{10}$ grain or, more rarely, $\frac{6}{10}$ grain in twenty-four hours. Following such doses he has never seen untoward effects. The various pathological conditions in which strychnine may be employed are numerous: diabetes mellitus and insipidus, certain paralyses, sunstroke, psoriasis, pulmonary tuberculosis, surgical shock, acute and chronic alcoholism, and in states of collapse and of nervous depression such as occur in infectious disease. In the last type of patients injections of strychnine

even up to a daily amount of $\frac{3}{10}$ to $\frac{1}{2}$ grain repeated for from four to eight days may be given without anticipating toxic symptoms. In fixing the dosage the patient's weight and the condition of the liver and kidneys should be taken into account. The drug has no cumulative effect.

Pyroligneous Acid in Arthritis Deformans.—ROSENTHAL (*Monthly Cyclopœdia of Practical Medicine*, 1907, x, 299) recommends this agent as affording relief from the pain and stiffness of this obstinate affection. Under its administration the redness of the joints disappears, the swelling diminishes, the rigidity of the joints and tendons is relieved, and the mobility returns to a greater or less degree; the fibrous ankylosis relaxes or can be broken up. Whenever the lesions are not hopelessly advanced they can be made to disappear and normal function is restored to the joint. After the use of the acid the joints can be forcibly moved and, though fibrous tearing may be felt by the patient, he complains but little of the pain and the reactionary hyperemia does not appear or is slight and evanescent. The restoration of function is well shown in the use of the hands and fingers. The claw-like posture, the position of extension, and the constant effort to protect the member are no longer seen, flexion and extension return, and the hand resumes its duties. The author cites 6 patients in whom benefit has followed the exhibition of pyroligneous acid. The usual dosage is 2 teapoonsfuls thrice daily.

The Advantages of Digalen Over Other Digitalis Preparations.—FRIEDLANDER (*Therap. Monats.*, 1907, iv, 173) states concerning this preparation, which is a soluble form of digitoxin, that it possesses the following good points: (1) Its taste is somewhat bitter, but is aromatic and not disagreeable. (2) Its strength is apparently constant. (3) It is convenient to handle, the patient being able to keep it with him in a small bottle, from which the dose is taken in drops. (4) It is not disturbing to the digestion. (5) It may be administered by means of intravenous or intramuscular injections, but not hypodermatically on account of the resulting pain and inflammation. (6) Its action is quick, becoming evident in about fifteen minutes after intravenous or intramuscular injection, and in from four to twelve hours after oral administration. (7) The dosage is constant, the strength of the preparation being always the same. (8) Cumulative action appears to be very rare.

The Treatment of Arteriosclerosis.—SENATOR (*Folia Therap.*, 1907, i, 37) states that in this affection the proteids should, as far as possible, be withdrawn from the diet. Meat and very rich foods are best altogether excluded. The regimen should consist chiefly of carbohydrates and fats—the so-called lacto-vegetarian diet, the allowable foods being bread, farninaceous foods, gruels, fats, and green vegetables. Eggs may be allowed in small quantity. Meat should be omitted or taken only in small amount, and of the watery kinds poor in albumin—the so-called white meats. Fresh fish may be eaten. In obese patients the sugars and starches should be diminished, but green vegetables and fruit are desirable and lean meat may be allowed. The bowels should be kept open and exercise should be taken. In diabetes the albuminous foods should be less restricted, but the carbohydrates must be limited,

for in most of these patients the reduction of sugar excretion is the leading indication for treatment. Recent investigations tend to show that by diet regulation the viscosity of the blood is lessened and thus the onward movement of the blood is promoted and the work of the heart and bloodvessels is lightened. Iodine also has an influence in diminishing the viscosity of the blood and also may exert a favorable action upon the arterial coats. The influence of the iodine preparations may be augmented by combination with the arterial dilators. Senator is accustomed to prescribe a mixture consisting of potassium or sodium iodide ½ to 2 drams and sodium nitrite 15 to 30 grains dissolved with 2 ounces of water. Of this 20 to 30 drops is taken three or four times daily. Glyceryl nitrate is also often prescribed. Hydrotherapeutic measures, especially carbon dioxide gas baths, and active or passive exercises may be employed in suitable instances. With regard to the use of the artificial blood salts given in the proportion in which they occur in normal blood, on the principle that these are diminished in arteriosclerosis, Senator states that he is not prepared to give an opinion as to their specific action, for he has employed them only in connection with other forms of treatment. The preparations of these salts consist of sodium chloride, sodium sulphate, sodium phosphate, sodium carbonate, magnesium phosphate, and calcium glycerophosphate. When administered with due regard to digestive conditions and in proper amounts, they are well borne.

The Treatment of Acne Vulgaris.—MARTIAL (*Gaz. méd. de Paris*, 1907, xiii, 4) states that in the treatment of this affection we should (*a*) modify the seborrhœic condition of the skin and (*b*) combat the eruption itself. The first of these considerations may be treated by lotions of water as hot as can be borne, of 3 per cent. sodium bicarbonate solution, or of 1 per cent. resorcinol or salicylic acid in alcohol. These should be applied preferably in the morning, toilet soap being avoided in so far as it is possible. During the day an ointment consisting of 15 parts of vaselin, 10 parts of lanolin, and 30 parts of lime-water should be employed, and at night one consisting of vaselin 25 parts, zinc oxide and starch, of each 12 parts, salicylic acid 1 part, and resorcinol 0.5 part should be rubbed in. Constitutional and digestive disorders should receive appropriate treatment.

Hematuria due to Small Doses of Hexamethylenamine.—BEARDSLEY (*Penn. Med. Jour.*, 1907, ix, 691) reports three instances in which hematuria developed very soon after the first dose of the drug was given, and in none of which more than 30 grains had been administered. The hematuria in these patients was discovered by the routine examination of the urine, and in the first two instances the drug was stopped at once, with the result that the hematuria also ceased. In the third patient the blood was thought to be due to the fact that circumcision had been lately performed and, the drug being continued, decided symptoms of strangury and bladder irritation appeared, with a large amount of blood in the urine; these symptoms were relieved as soon as the hexamethylenamine was stopped.

Nucleinic Acid Injections in the Induction of Hyperleukocytosis.—Diez and Campora (*La quinzaine thérap.*, 1907, viii, 95) have performed a series of experiments upon guinea-pigs, based upon the principle that nucleinic acid injections are capable of increasing the number of leukocytes in the circulating blood. In one series of experiments upon twenty-four of the animals they found that intraperitoneal and subcutaneous injections of the acid caused first a brief hypoleukocytosis, followed by hyperleukocytosis lasting about seventy-two hours. In a second series they found that the evolution of peritonitis due to intestinal perforation was distinctly delayed in guinea-pigs which had previously (six, twelve, eighteen, and twenty-four hours) been subjected to nucleinic acid injections. From these and other experiments it is concluded that injections of the acid should be useful in abdominal operation in human beings to augment the resistance of the peritoneum, as well as in intestinal or gastric perforation.

PEDIATRICS.

UNDER THE CHARGE OF

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The Acetonemic Conditions of Children.—F. Langmead (*Brit. Med. Jour.*, 1907, ii, 819) divides patients, in whose urine diacetic acid and acetone are detected by ordinary methods of examination, into 3 groups: (1) Those who usually show no symptoms of acidosis. Included among these are cases of excessive fat ingestion, starvation, gastric ulcer, malignant disease, and many others, perhaps all due to deprivation of carbohydrates. (2) Those who, while suffering with other morbid states, have also symptoms of acid poisoning, such as those suffering from diabetes, gastro-intestinal disturbance, epidemic diarrhœa, sepsis, peritonitis, and certain forms of poisoning, as morphine, phloridzin, etc. (3) Patients suffering from uncomplicated acidosis, which may terminate fatally. These are the subjects of delayed anesthetic poisoning and of recurrent, cyclical, or periodic vomiting, conditions known as cryptogenic acidosis. The symptoms of acidosis include dulness, drowsiness, or even coma; in some cases restlessness, delirium, and convulsions; flushed face, dry and rough tongue and lips, and great thirst; the breath has the odor of acetone and the urine contains acetone, diacetic acid, and sometimes β-oxybutyric acid. In grave cases there is persistent vomiting, rapid wasting, slight icterus, and hyperpyrexia. Langmead reports 3 cases in which the symptoms were due to previous anesthesia; in 2 chloroform was the anesthetic, in 1 nitrous oxide; the last patient recovered. He also reports 3 cases of acidosis in the course of recurrent vomiting. In all 5 of his fatal cases the autopsy revealed a very fat, buff-colored liver; fatty degeneration was present also in other organs, but not to the same extent. He

considers the cause of acetonemia to be failure of fat oxidation. His conclusions are: Acetone and diacetic acid are found in the urine in a number of conditions, and may be, but are not necessarily, associated with symptoms of acidosis. Cyclic vomiting and delayed anesthetic poisoning are examples of acidosis of unknown origin. Delayed anesthetic poisoning is due not so much to the kind of anesthetic used as to the state of anesthesia. The acetone series is a product of the imperfect oxidation of fats, and hence, in these conditions the oxidizing power of the tissues must be inadequate. This is further demonstrated by the condition of the liver. There is evidence in favor of the failure of oxidation being due to too great a supply of fat to the chief seats of oxidation rather than to a primary deficiency in oxidizing power, although the latter alternative cannot be excluded. Probably this may be brought about by a variety of toxins which act like phosphorus. The determining cause of acidosis is the accumulation of the precursors of acetone, either from excessive formation or deficient excretion. Anesthetics are dangerous to patients who are the subjects of acidosis. He advises the following routine measures to prevent a possible acetonemia: give alkalies in all cases before the operation if the patient is subject to acidosis, and particularly if he has bilious attacks; also if the urine contains acetone; use ether in preference to chloroform in such cases. When acid poisoning is present a purgative should be given at once and the stomach washed out; bicarbonate of sodium solution should be given intravenously, and lactate of sodium by mouth; if the patient can be fed by mouth, no fats should be given.

Tricocephaliasis.—Up to ten years ago the trichocephalus was considered a harmless parasite of the large intestine, but since then a number of grave and even fatal cases have been reported; it may be as dangerous as Anchylostomum duodenale, Bothriocephalus latus, and Trichina spiralis. In certain portions of Switzerland it occurs in 25 per cent. of the people. The eggs are usually swallowed with water or by eating earth; each infected individual forms a source of danger for his surroundings. The symptoms produced depend on the number of parasites in the host, the time of infection, the size of the parasites, and the general health of the patient. Concerning the manner in which the worm produces the symptoms associated with its presence there are differences of opinion; some say that it sucks blood directly from the bloodvessels of the intestinal mucosa, others that it produces a toxin, which acts as a hemolytic agent. No matter how produced, it is true that anemia is probably the most prominent symptom. R. KAHANE (*Corres. f. Schweiz-Aerzte*, 1907, xxxvii, 235) reports the case of a girl aged four and a half years, who had been suffering with diarrhœa since childhood, but the stools contained no tubercle bacilli a year prior. The patient at that time was markedly anemic and a hemic murmur could be made out. Until the child was old enough to be taken into the field she was well, and only developed the anemic state after she began to eat earth, which she was very fond of; an older brother had the same habit, and was also very anemic. The examination of the heart showed marked enlargement and a loud systolic murmur; hemoglobin estimation 15 per cent. The stool contained large numbers of the ova of Trichocephalus dispar and blood. Thymol by the mouth and by

enema brought away twenty specimens of the parasite and numerous ova; slight improvement resulted. Numerous worms continued to come away with the enemas, but in spite of this the patient became worse; albumin and sugar appeared in the urine, the face and ankles became edematous, and petechiæ appeared in a number of places, and death ensued. The autopsy showed the heart to be enlarged, the muscle soft and flabby; the valves were not diseased. The liver was enlarged, fatty, and typically nutmeg. Both kidneys were diseased. The small intestine was contracted; the large intestine, but especially the cecum, markedly dilated; uncountable parasites were found throughout the large intestine, partly buried in the mucosa, and partly swimming loose in the contents of the bowel. The appendix contained ova and worms, and was in a state of chronic inflammation; clinically the patient frequently had had attacks of colic referable to the right iliac fossa.

A New Operation for Penile Hypospadias.—R. T. H. BUCKNALL (*Lancet*, 1907, ii, 887) describes a new operation for the relief of penile hypospadias, which has proved very successful in his hands. Three patients were operated on and cured. The advantages which he claims for the operation are as follows: It is performed in two stages, each of which is rapidly accomplished. This lessens shock and enables the operation being done at an early age, the ultimate result being all the better for it. The skin utilized for the roof and floor of the new urethra is not dissected up or even touched; consequently, it retains its vitality and does not tend to slough. No sutures project into the lumen of the new urethra. The skin of the roof and floor of the new urethra is in continuity with the skin of the roof and floor of the previously existing one. This avoids the possibility of a fistula or stricture at the site of the false meatus. No buried sutures are necessary, and the apposition of the broad, raw surfaces of the flaps on either side prevents leakage. The disadvantages are that it is applicable only if the scrotum is uncleft; hair may grow later from the skin of the scrotal raphe which forms the floor of the new urethra. The former objection is minimized by the small number of cases not penile. The raphe grows very few hairs; if the operation is done early, the epithelium may change its characteristic and not develop hairs; if hairs do grow they are not necessarily troublesome.

Notes on Certain Fatal Forms of Pharyngeal Diphtheria.—A. HARRIS (*Lancet*, 1907, ii, 896) states that there are forms of diphtheria in which a fatal ending can with certainty be predicted. The symptoms presented by these cases are as follows: (1) A grayish color of the face, which in addition presents an anxious expression. (2) Vomiting independent of food and not accompanied by nausea; it presents a similarity to cerebral vomiting; the vomitus is yellow or green. (3) Abdominal pain referred to the umbilicus, without abdominal tenderness. (4) Albuminuria, usually a large amount, but no tubecasts. (5) Suppression of urine is the rule in these cases. (6) Alteration in the rhythm of the heart sounds. This appears after the vomiting has set in. The alteration is usually the gallop rhythm. The patients are generally very restless, and consciousness is maintained to the end.

The membrane of the throat in these cases is dark colored and the smell of the breath is most offensive. Antitoxin has not the slightest effect in these cases, although 6000 units were given in each instance. Six cases are reported. Large numbers of streptococci and staphylococci were associated with the diphtheria organisms in the swabs from these throats. Harris does not believe that they were the cause of the fatal termination, but suggests the possibility that there are different kinds of diphtheria bacilli, which elaborate different toxins, and which may be neutralized only by special antitoxins.

Arthropathy in Rötheln.—D. A. ALEXANDER (*Lancet*, 1907, ii, 921) reports the following remarkable case: The patient, a male, developed, after a few days of sore throat, stiff neck, malaise, and moderate fever, a rash having the distribution and appearance of German measles and accompanied by an enlargement of superficial glands, notably those of the neck. Before the exanthem had faded the patient began to complain of stiffness and tenderness in the knees and ankles, and soon all the interphalangeal joints of the fingers presented the spindle-like swelling commonly seen in rheumatoid arthritis. There was no exacerbation of temperature and neither cardiac nor other complication. A fortnight from the appearance of the rash all the symptoms were subsiding, and in the six months which have elapsed only an occasional transient stiffness in the fingers reminds the patient of the attack.

OBSTETRICS.

UNDER THE CHARGE OF

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Deciduoma Malignum.—TRILLAT and VILLOT (*Jour. l'obst.*, March, 1907) conclude a paper upon this subject as follows: The epithelial elements of different sources which form chorio-epithelioma take origin in epithelium, and exclusively in the villi of the chorion. Neither the stroma nor the decidua shares in this process. The recognition of this condition enables one positively to identify a typical or an atypical case.

Between the typical and atypical cases it is impossible always to make a clear distinction. Especially is this seen in cases in the early stages of pregnancy in which the typical arrangement of the different elements of the tumor seems to have been destroyed. In these cases the process does not always go on to the formation of a pronounced tumor, but infiltrates more or less deeply the uterine tissues with isolated ectodermal cells which take origin from the chorial cells in the decidual basement membrane. This is often found in hydatid mole or in the early stages of placental development.

Chorio-epithelioma always develops after pregnancy, abortion, or molar pregnancy. Its point of origin is first within the uterus at the border of the zone of placental insertion in normal pregnancy, or where

the placental tissue begins to form in the tube in ectopic pregnancy. We sometimes find cases of chorio-epithelioma outside the zone of placental insertion. This is explained by the transference through the circulation of debris from the villi of the chorion which develop at the border of this zone or give place to a primitive chorio-epithelioma. Such a tumor has a biology of its own with a tendency to spread and to destroy surrounding tissue, with an absence of bloodvessels and lymphatic formation. Clinically the disease shows itself by severe hemorrhage and increase in the size of the uterus, with the phenomena of metastatic infection in the early stages. In some cases hemorrhage in the substance of the tumor occurs through ulceration of its peritoneal surface. The spontaneous cure of chorio-epithelioma has been observed. Bilateral degeneration of the ovaries, usually cystic in character, has also been found coincident with hydatid mole or chorio-epithelioma. The recent studies of Bonnet lead us to consider chorio-epithelioma as derived by a histolytic process from the fœtal ectoblast, from the very first stages of the development of the ovum up to the point of its nidation. One must admit that the formation of chorio-epithelioma seems to be an attempt at a normal physiological process whose character is altered by some agency yet to be determined.

Abdominal Section for Irreducible Retroversion and Retroflexion of the Pregnant Uterus.—KÜSTNER (*Monats. f. Geburts. und Gynäk.*, 1907, Band xxv, Heft 2) reports the case of a multipara admitted to the clinic with pronounced ischuria. The uterus was pregnant and retroflexed, and efforts to replace it failed. The patient had previously been under treatment, when it was found that the uterus was fixed by adhesions. Accordingly abdominal section was performed.

The uterus was between the fourth and fifth month; the anterior wall extended above the smaller pelvis; very abundant but thin and fibrous adhesions were found preventing the replacement of the uterus, and extending between the posterior wall, tubes, and ovaries, the peritoneum about the rectum, and posterior wall of the pelvis. These adhesions were broken up by the fingers, and some of them, which were especially firm, with the Paquelin cautery. The adhesions extended deeply in the posterior cul-de-sac to the posterior aspect of the cervix, the wall of the vagina, and the surrounding peritoneal tissue. After severing the adhesions the uterus was readily replaced. After the operation a pessary was worn and a catheter allowed to remain in the bladder for eight days. The patient's pregnancy was uninterrupted, and the pessary was removed when the uterus had ascended into the abdomen. Küstner calls attention to the fact that no other method of treatment could have been successful in this case.

Ruptured Ectopic Gestation with Free Hemorrhage into the Abdominal Cavity.—HAIM and LEDERER (*Monats. f. Geburts. und Gynäk.*, 1907, Band xxv, Heft 2) conclude a paper upon this subject, and report briefly 27 cases. These came to operation, 23 of them recovering and 4 dying. The mortality stated by others under this condition was 14.4 per cent., 24.6 per cent., 20.3 per cent., but the present series of cases gives a mortality of 14.8 per cent. One of these patients died from acute anemia four hours after section. In another patient the diagnosis

was obscure, and curetting was first done. Two days afterward section was performed and the fœtal sac extirpated. The patient had high fever until her death. Autopsy showed a purulent endometritis, thrombophlebitis, and peritonitis.

The third case had pronounced bronchial symptoms and subnormal temperature. Autopsy showed pulmonary tuberculosis and purulent peritontis.

In another case during abdominal section the bladder, which was drawn up upon the anterior abdominal wall, was wounded. Fever occurred, with death after a week. Autopsy showed peritonitis and degeneration of the heart muscle.

As regards the convalescence of the 23 patients who recovered, severe complications were remarkable for their absence. In 1 patient cystitis developed fourteen days after operation, which prolonged the convalescence. Another patient had, a week after operation, considerable hemorrhage from the vagina which did not seem to affect the healing of the tissues.

As regards temperature, 8 patients had no elevation after operation; in 7 the temperature was subnormal; in 8 cases high fever was present during the first days. In most of these chills occurred at intervals for four days. These transient fevers, which did not affect the healing of the wound, seemed to be from intoxication produced by the absorption of extravasated blood within the abdominal cavity. In some patients hemoglobinuria accompanied these phenomena. The essential process seemed to have been hematolysis. The length of convalescence was on the average twenty-six days. Other operators give the average time of recovery as thirty-six and forty-six days.

Among the complications observed were thrombosis, pleuro-pneumonia, hemorrhagic infarcts, exudate in the stump, and bleeding from the stump. Some of these occurred in 14 cases. The shortest convalescence was fifteen days, the longest fifty-nine days. In 8 patients convalescence was shorter than twenty days; in 9 less than thirty; in 3 under forty; while in 2 it was not complete in fifty days.

As regards the permanent results of operation for ectopic gestation, it was possible to trace most of the cases operated upon. In 22 patients information concerning their subsequent health was obtained in 14; of these, 11 were completely well and free from all disturbances; 2 of these had ventral hernia. Among the 16 cases coming later under observation ventral hernia was observed in 4, and was thought to have been caused by the use of the tampon at the time of operation. One patient developed severe cystitis and hernia during convalescence.

If the permanent results of these operations be compared with those of other surgical procedures in 47 abdominal sections, 11 had permanent complications after recovery and 2 had ventral hernia.

It is estimated that 67 per cent. of patients after abdominal section become perfectly able to do active work. In contrast to this are the statistics of Seidl and Uthmöller, who found respectively that in 96 and in 80.9 per cent. the patients were able to do their accustomed work after abdominal section.

As regards subsequent conception in these cases, the tendency to the repetition of the complication is well known. Sufficient time has

scarcely elapsed since some of these operations to enable one to judge, as in 16 cases 2 patients have passed through normal labor since the operation, 2 had uterine abortion, and 1 had advanced three months in pregnancy.

GYNECOLOGY.

UNDER THE CHARGE OF

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Fibroma of the Ovary fixed in the Pelvis, Causing Complete Extrusion of the Uterus.—DAUBER (*Brit. Gyn. Jour.*, 1907, pt. lxxxix, suppl. to vol. xxii, 9) reports the case of a woman of seventy-seven years upon whom he operated successfully.

Sarcoma of the Parovarium.—SPANTON (*Brit. Gyn. Jour.*, 1907, xxii, 31) reports a case occuring in a woman, aged forty-two years, who had been married sixteen years and had two children born alive and one miscarriage twelve years ago. Her general health had been good and she never had any illness until five years ago, since when neuritis of the limbs and head appeared. The catamenia appeared regularly every three weeks up to two years ago, but since she had had only four or five periods. Believing herself pregnant, as she had noticed an enlargement of the abdomen for a year, she had three months ago consulted her physician, who examined her and found she had a fluctuating, cystic growth. To the right of the uterus a hard mass could be felt, movable like the base of a multilocular ovarian cyst. The uterus was normal. Upon operation a thin-walled parovarian cyst, containing two gallons of clear, straw-colored fluid, was found. At its base was a solid growth springing from the outer extremity of the left Fallopian tube. The growth was removed, the base ligated, and the ovary left behind. The tumor was found to be extensively infiltrated with spindle-celled sarcomatous growth, probably of endothelial origin. It has a capsule of fasciculated fibrous tissue, and the periphery is more or less alveolated by strands of unabsorbed stroma. Toward the centre there are more alveoli and less stroma. No ovarian tissue can be detected. Spanton thinks the interest in the specimen lies in the sarcomatous infiltration occurring in a simple cyst, having all the characteristics of a rapidly growing parovarian cyst, and the extreme thinness of the cyst wall.

Rupture of an Ovarian Cyst During Pregnancy Causing Grave Internal Hemorrhage.—MORESTIN (*Ann. de gyn. et d'obst.*, October, 1907, 602) reports a case in a woman of thirty-five years, who was four months pregnant and brought into a hospital in profound acute anemia from internal hemorrhage. A rapid operation was done, and abortion occurred two days later. Much bloody fluid was removed from the peritoneal cavity. The wall of the removed cyst, which was ruptured, was

markedly infiltrated with blood. The appearance of the tumor resembled that due to twisted pedicle, and Morestin believes this condition caused the hemorrhage and rupture. The history of the case supports the belief, pregnancy being one of the chief causes of such torsion. The recovery was tedious.

Uniting a Double Uterus.—STRASSMANN (*Zentralbl. f. Gynäk.*, 1907, xxxi, 1322) states that in a case previously reported and in two new cases reported in this article a septum dividing the uterus into two cavities was removed. The first patient operated upon later gave birth to a live child. The result in the first of the new cases was considered satisfactory five months after the operation. In the second of the new cases the operation was undertaken primarily for a tumor of the adnexa. The patient died seven days after the operation from ileus. The last case reported was one in which the uterus was divided to the cervix. The operation was undertaken solely for the purpose of correcting this condition. The patient gave a history of eight pregnancies terminating in from three to eight months. The fetus in each pregnancy was in the left uterus, which was larger than the right. The uteri were brought down through an opening in the vesico-vaginal pouch and sections from the inner side of each removed. The uteri were then sewed together, replaced, and sutured to the bladder. The septum in the cervix and one in the vagina were divided. An examination three months after the operation showed that good results had been obtained. The author considers that an operation for a non-functionating bifid or septate uterus is as justifiable as one for cleft palate.

Carcinoma of the Ovary Involving the Sigmoid Flexure.—BOWERMAN JESSETT (*Brit. Gyn. Jour.*, 1907, pt. lxxxix, suppl. to vol. xxii, 41) reports a case of this kind that occurred in a subject forty-eight years of age who had had four children. The menopause had occurred six years previously. At the first examination Jessett had found a small tumor that he considered a fibroid in the posterior wall of the uterus. Fifteen months later the tumor extended from Douglas' pouch nearly to the umbilicus and was somewhat fixed. With the diagnosis of rapidly growing myoma Jessett operated. The growth was found firmly attached to intestines and omentum and particularly to the sigmoid. It proved to be ovarian, and resection of the sigmoid proved essential. Both ovaries were removed and found infiltrated by alveolar carcinoma, but at different stages. The larger was solid and rather soft, was seen to be very cellular, and growing actively. The growth had become atypical, the aggregated masses of epithelium showing in parts a tendency to mucoid degeneration, the fibrous stroma, which was ill developed, being infiltrated by a large number of inflammatory cells. The smaller growth was less advanced and more atypical. The arrangement of ovarian tissue was more easily traceable and less tendency to degeneration was noted.

The Diagnostic Value of Koch's old Tuberculin in Gynecology.—PANKOW (*Zentrlbl. f. Gynäk.*, 1907, xxxi, 1257). The diagnostic value of the tuberculin was studied in 32 cases. In 24 of the cases the tuberculin reaction coincided with the anatomical and histological evidence. There

was no tuberculosis in 23 cases, yet in 3 of these the tuberculin reaction was positive. Tuberculin was present in 9 cases, 5 of which failed to show the local reaction to tuberculin, although all 9 showed the general reaction as indicated by chills, fever, vomiting, etc. The results are therefore, rather unfavorable to the contention of Birnbaum that in tuberculosis of the genito-urinary organs the injection of tuberculin gives rise to localized symptoms such as pain, establishing the nature of the disease. The main conclusion drawn by the author is negative in character, and is to the effect that the absence of both general and local symptoms following tuberculin injections practically excludes tuberculosis of the female genito-urinary organs.

Abdominal Colpopexy for Prolapsus Uteri.—JACOBS (*Brit. Gyn. Jour.*, 1907, lxxxix, suppl. to vol. xxii, 76–81) describes this new operation as follows: Abdominal section, the incision reaching to the pubes. The uterus is strongly drawn upward to stretch the vaginal walls, and is freed from its ligamentary attachment to the right and left by severing the broad ligaments outside the appendages. The ovarian vessels are secured and the round ligaments severed, the incision continuing to the uterine arteries at the level of the cervix, where they are clamped and divided. The uterosacral ligaments are next divided. The uterus and appendages are now lifted out of the abdomen. The bladder and peritoneum is then pushed away from the anterior vaginal wall as far as possible. The posterior vaginal wall is freed from the peritoneum and the rectum as far as practicable. The uterus is severed from the vagina, taking with it a V-shaped portion of the latter anteriorly and posteriorly. Anterior and posterior colporrhaphies are done from above, the knots of the sutures, which are placed from below upward and tied as soon as placed, being left on the vaginal side. The severed end of the vagina is closed. The broad ligaments are next covered with peritoneum, being whipstitched. The next step is placing two silk sutures through the round and uterosacral ligaments and the upper end of the vagina. The abdomen is closed. Jacobs did 77 operations from 1894 to January, 1907, on patients between the ages of forty-three years and seventy-one years, with 1 death that was due to gastric complications of a specific origin. There have been but 3 recurrences, and these slight in character.

Sarcomatous Cyst of the Ovary in an Hermaphrodite having a Masculine Appearance.—CHAUVEL (*Ann. de gyn. et d'obst.*, October, 1907, 605) reports a case of this character occurring in a child of fifteen years, in which he performed laparotomy, removing the tumor, death occurring in five and a half months from manifest return of the disease. The child was cryptorchid. It appeared to be a case of hypospadias in a male child otherwise normal. Even the voice seemed but natural for a boy of fifteen years. The presence of a tumor the size of a large fist was noted in the right iliac fossa and the abdomen was distended by fluid. Upon laparotomy being made, a large amount of dark blood poured out, revealing a large cystic tumor of the right ovary. It contained a thin fluid. The Fallopian tube was plainly visible, as was the left ovary and tube. No uterus could be found, and the pelvis had a masculine shape. Six months later the patient died from a similar development, probably

in the left ovary. The tumor removed proved upon microscopical examination to be a sarcomatous cyst of a very malignant type. It had developed rapidly and with monthly attacks of local peritonitis. The blood found in the peritoneal cavity was found to be due to a partial rupture in the end of the tumor near the stomach. The presence of the tubes and ovaries caused the parents great consternation.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Practical Experience with Serum-therapy in Ulcus Serpens.—MAYWEG (*Archiv f. Augenheil.*, August, 1907, p. 417) reports of 23 cases of ulcus serpens, the pneumococcus was found alone in 22, the diplobacillus in 1. Passive immunization only was employed. The results were excellent in 8, even as to sight; good in 7; in 3 relapse followed decided improvement (the treatment was intermitted too soon); in 4 cases no direct improvement, but even in these the final result was less unsatisfactory than was to be expected from previous methods of treatment alone. The best results are obtained if the serum be employed at the earliest possible moment (10 c.c. in the beginning, three times daily) and continued until healing is complete. The time of treatment is much shorter compared with other methods (fourteen days on the average as against four to five weeks), the restoration a more complete one, cicatrices more transparent, and sight better. The complications following operative treatment do not occur.

Treatment of Myopia.—SATTLER (*Archiv f. Augenheil.*, May, 1907, p. 187) maintains the following: (1) Myopia may be prevented from increasing by full correction through the maintenance of an adequate distance for near work and prevention of excessive depression of the visual plane. (2) In youthful subjects the full correction cannot rarely be borne in myopia of 10 D. and higher. (3) If the myopia should nevertheless progress, the increase is as a rule but slight. (4) In high degrees of myopia also it is necessary to maintain the working distance through a suitable correction at 20 to 25 cm. at least. (5) A timely accurate correction seems to protect the myopic eye from the special dangers threatening it. (6) Insufficiency of convergence is, as a rule, satisfactorily relieved by full correction. (7) If muscular asthenopia persists when a sufficient degree of exophoria is present, the setting back of one or both external recti is necessary, or in default of this a suitable

prismatic combination. (8) In the highest degrees of myopia (18 D. and upward) in young subjects until about 40, extraction of the lens is to be recommended. (9) Primary extraction is superior to Fukala's method of primary discission for the following reasons: smaller number of operations, earlier result, less danger of loss of vitreous, prevention of increased tension and its consequences, and finally, as it seems lessened, danger of postoperative retinal detachment.

Blindness in Portugal.—MEYER (*Archiv f. Augenheil.*, May, 1907, p. 195) reports that a recent census in Portugal gives 6222 blind and 6320 having but a single eye among the 5,166,841 inhabitants of that country, giving 12 blind in 10,000. The true number is no doubt greater. Of 2000 instances the causes were as follows: congenitally blind, 9.1 per cent.; traumatisms, 8.6 per cent. (mostly from blasts in quarries); smallpox, 7 per cent. The percentage of trauma responsible for the loss of one eye was also very high; 40 per cent. were due to blasts. The remaining most important causes, as gathered from inmates of institutions, were tabes, meningitis, trachoma 3.2 per cent., blennorrhœa (gonorrhœal), myopia, glaucoma 35.17 per cent. Trachoma is endemic in many parts of Portugal, so that 12 per cent. of the patients of the Ophthalmic Institute of Lisbon suffer from this disease. The percentage from glaucoma, 35.17 per cent., is so high for the reason that almost all cases come for treatment when it is too late. Instruction in diseases of the eye is very inadequate (there is but one chair of diseases of the eye in the entire kingdom). The lists showed that about 50 per cent. of the entire number were preventable.

Airol.—FISCHER (*Centralb. f. prak. Augenh.*, August, 1907, p. 229) resumes his report upon this agent published in the December number, 1896, of the same journal, emphasizing the most important property of this remedy, namely, its extremely favorable action in the severest forms of corneal ulceration. The powder is dusted into the eye four times daily after preliminary cocainization. In cases of severe ulcus serpens which continued to progress even after the use of the galvanocautery, the insufflations frequently obviated the necessity of a further application of the cautery or even of the Saemisch operation.

In three cases of gonorrheal conjunctivitis in children in which half of the cornea was in a state of suppuration with threatening perforation, and even when the latter had already occurred, the insufflations, of course without a bandage, were successful in preserving the cornea; strange to say, neither the swelling nor the secretion were influenced.

Pathological Hippus.—AURAND and BREUIL (*Archiv. d'Ophtalmol.*, February, 1907, p. 74) come to the following conclusions upon this subject: (1) The term pathological hippus is used to designate variations in the diameter of the pupil which seem not to depend solely upon ordinary physiological causes, and which are characterized by movements abnormal in frequency or character. It is therefore not always simple exaggeration of a physiological phenomenon. (2) It seems necessary to distinguish several varieties of pathological hippus, according to the following categories: (*a*) Hippus from hyperexcitability of the nervous centres; this variety is a kind of ataxia of the pupil and

the only one which can be considered as resulting from exaggeration of the physiological phenomenon. (*b*) Respiratory hippus; this form accompanies the movements of respiration, producing through their effect upon the circulation an inspiratory mydriasis and expiratory myosis. (*c*) Hippus accompanying paralysis of the third nerve in process of convalescence; this is a sort of nystagmus of the pupil, the mechanism of which is the same as that of the nystagmic movements of the extrinsic muscles when these are called into function. (*d*) Rhythmic hippus; this special form seems to be due to a kind of autonomous action of the peripheral centres of the iris. These centres are habitually under the influence of numerous other centres which govern them; the former under certain conditions of isolation suffice to bring about the abnormal movements of the pupil. The latter conclusion is supported by a case reported *in extenso*.

PATHOLOGY AND BACTERIOLOGY.

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Physiological and Pharmacological Studies of Magnesium Salts.—The work of Meltzer and his co-workers have shown that the magnesium salts have remarkable action in producing nervous inhibition and anesthesia when injected subcutaneously, intravenously, or when introduced into the spinal canal. In order to study the method of elimination from the body of these salts, MELTZER and LUCUS (*Jour. Exper. Med.*, 1907, ix, 298) have conducted a series of experiments to determine the influence of nephrectomy upon the toxicity of magnesium salts. From these experiments it is concluded that magnesium salts, when introduced subcutaneously, are eliminated to a great extent through the kidneys. After nephrectomy in rabbits the susceptibility to the magnesium salts is increased by about 50 per cent.; so they concluded that the kidneys apparently eliminate about 50 per cent. of the injected salts. It was found that an injection of magnesium sulphate was more toxic immediately after nephrectomy had been performed than when it was introduced eighteen or more hours after the operation. This is probably due to the development of vicarious paths sufficient for elimination of a fraction of the salts. The cumulative effect of magnesium salts in nephrectomized rabbits was very striking. The effect of several subminimum doses was equal to the effect produced by the sum of these doses given at a single injection, while in rabbits in which nephrectomy had not been performed the effect was not cumulative because apparently the salts are eliminated by the kidneys.

The Pathogenesis of Gallstones.—KRAMER. (*Jour. Exp. Med.*, 1907 ix, 319) points out that the present theories of gallstone formation do not explain the process by which cholesterin and calcium salts, which are normally soluble in bile, are precipitated in cholelithiasis. In order to determine whether bacteria played a part in this precipitation, typhoid and colon bacilli and staphylococci were grown in a carefully filtered mixture of equal parts of bile and alkaline peptone solution. All of the organisms grow well in this medium. The staphylococci did not produce any change in the reaction of the medium, nor did any precipitation occur. With both varieties of bacilli, however, the medium became cloudy and in about four weeks a very well-marked, closely packed, semisolid mass was seen at the bottom of the tubes. The constituents of gallstones were found microscopically in this sediment. The bile seems to have a markedly preservative action on the typhoid and colon bacilli, thus showing a parallel to the fact that these bacilli remain alive a long time in gallstones. Kramer believes that these experiments indicate very clearly that gallstone formation is due to chemical decomposition of the bile, the direct result of the growth of microörganisms therein. He considers it a process similar to the formation of phosphatic urinary stones.

The Muscular Connection between the Auricle and the Ventricle (His' Bundle) in Normal Hearts and in Adams-Stokes Disease.—FAHR (*Virch. Arch.*, 1907, clxxxviii, 562) has studied the heart in three cases of Adams-Stokes disease with particular reference to the condition of the bundle of His. In the first case the bundle was longer than it is in normal hearts, and since the sections did not include the terminal portions, no definite conclusions could be drawn as to its complete integrity. In the second case a gumma was found in the ventricular septum which extended to the annulus fibrosus. In this region the fibers of the bundle, as they emerged from the annulus fibrosus, were completely destroyed by the syphilitic infiltration. In the third case a fibrous scar was found at the point at which the bundle divides. The scar tissue involved the left branch, but at this point the right branch was not involved. The fibers of the bundle running to the right ventricle however, were, destroyed by a fibrous thickening at the point at which they enter the musculature of the right ventricle. Fahr, from a study of normal hearts, reached much the same conclusion as to the structure and course of this bundle of muscle fibers as did Tawara. He could not, however, show that the termination of the fibers in man was the same as Tawara has described in the sheep. In the sheep it can be readily demonstrated that the bundle ends in the complicated network of Purkinje fibers which lie directly beneath the endocardium and run to all parts of the ventricle, whereas Fahr states that in man the bundle does not connect with any meshwork of fibers analogous to the Purkinje fibers of the sheep, but terminates in the muscular wall of the ventricle.

In the fœtus the bundle can be recognized early in the development of the heart. In a fœtus 16 cm. in length the bundle could readily be made out, though the branching was not seen in such young embryos. In the fœtus there is no difference between the histological structure of the fibers of the bundle and of the heart muscle. In the adult the histological differences are very evident, for the fibers of the bundle retain their fœtal character.

Studies in Experimental Alcoholism.—Except for the anatomical changes resulting from the excessive use of alcohol, pathological anatomy has not been able to shed any light upon the effects on man of moderate amounts of alcohol. As regards the general effects of alcohol upon metabolism, it was formerly thought that alcohol retarded the oxidative processes of the body. Later it was held that alcohol acts as a food, and is used in place of carbohydrates, fat, and even proteids, which are thus stored up in the body. Reid Hunt (*Bull. Hygienic Laboratory*, 1907, No. 33), in a series of interesting experiments, is the first to show experimentally that profound modifications of certain physiological processes may result in a comparatively short time from doses of alcohol so small that indications of intoxication are absent. In these experiments the susceptibility of mice, which had been fed upon alcohol, to acetonitril was studied. Acetonitril, or methyl cyanide, is changed in the body into hydrocyanic acid, which unites with sulphur to be eliminated as sulphocyanic acid. The poisonous effects of acetonitril are thus due to the formation of hydrocyanic acid. From a series of experiments upon analogous substances Hunt formed the hypothesis that hydrocyanic acid is liberated from acetonitril through oxidation of the methyl group. In a long series of experiments it was shown that animals to which alcohol had been administered for some time acquire an increased susceptibility to acetonitril. This occurs after the administration of amounts of alcohol far too small to cause indications of intoxication, and from doses which almost certainly cause no anatomical lesions. This increased susceptibility is not due to a general "lowering of resistance," but is associated with a distinctly increased power of the body to break up the molecule of acetonitril. This is shown by the marked increase of sulphocyanate in the urine of the animals to which alcohol had been fed. This increased breaking up of the acetonitril depends upon the increased powers of oxidation on the part of the body. It is believed that these experiments afford clear experimental evidence for the view that extremely moderate amounts of alcohol may cause distinct changes in certain physiological functions, and that these changes may, under certain circumstances, be injurious to the body. The results also afford further evidence that in some respects the action of alcohol as a food is different from that of carbohydrates, and, finally, that in all probability certain physiological processes in "moderate drinkers" are distinctly different from those in abstainers.

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